

AD-A038 514

LOCKHEED MISSILES AND SPACE CO INC HUNTSVILLE ALA HU--ETC F/G 4/2  
REMOTE WIND MEASUREMENT IN FOG USING LASER DOPPLER VELOCIMETRY.(U)

DEC 76 H R BRASHEARS, W R EBERLE

F19628-76-C-0237

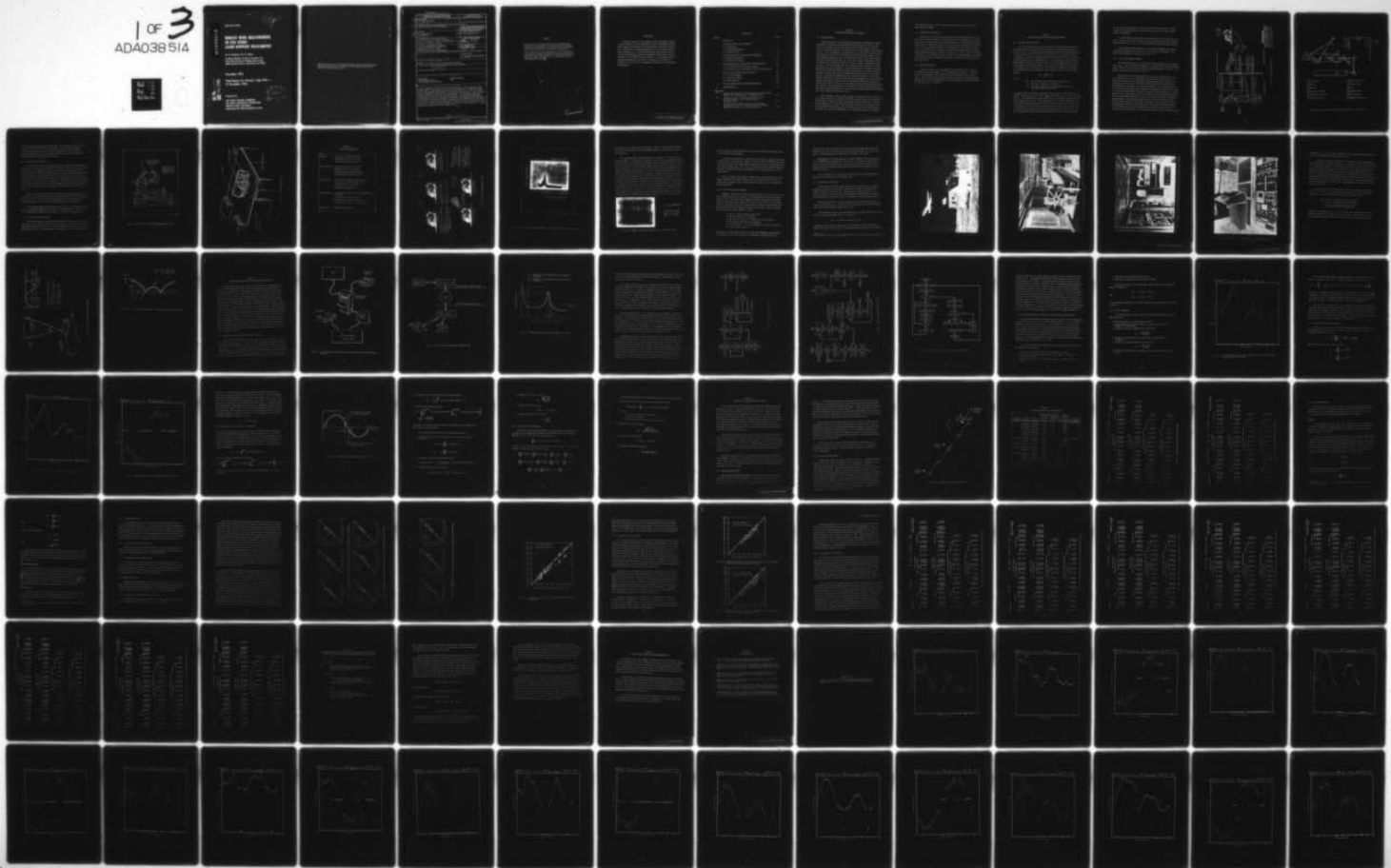
UNCLASSIFIED

LMSC-HREC-TR-D497127

AFGL-TR-76-0313

NL

1 OF 3  
ADA038514



AD A 038514

AFGL-TR-76-0313

120

# REMOTE WIND MEASUREMENT IN FOG USING LASER DOPPLER VELOCIMETRY

M. R. Brashears, W. R. Eberle

Lockheed Missiles & Space Company, Inc.  
Huntsville Research & Engineering Center  
4800 Bradford Drive, Huntsville, AL 35807

December 1976

Final Report for Period 1 July 1976 —  
31 December 1976

AD No. \_\_\_\_\_  
DDC FILE COPY

Prepared for

AIR FORCE SYSTEMS COMMAND  
AIR FORCE GEOPHYSICS LABORATORY  
UNITED STATES AIR FORCE  
HANSCOM AFB, MASSACHUSETTS 01731

DDC  
RECEIVED  
APR 20 1977  
A

Qualified requestors may obtain additional copies from the Defense Documentation Center. All others should apply to the National Technical Information Service.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

19 REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER AFGL-TR-76-0313	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) REMOTE WIND MEASUREMENT IN FOG USING LASER DOPPLER VELOCIMETRY.		5. TYPE OF REPORT & PERIOD COVERED Final July 1976 - December 1976	
7. AUTHOR(s) M.R. Brashears W.R. Eberle		6. PERFORMING ORG. REPORT NUMBER LMSC-HREC-TR-D497127	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Lockheed Missiles & Space Company, Inc. Huntsville Research & Engineering Center Huntsville, Alabama 35807		8. CONTRACT OR GRANT NUMBER(s) F19628-76C-0237	
11. CONTROLLING OFFICE NAME AND ADDRESS Air Force Geophysics Laboratory Hanscom AFB, MA 01731 Monitor/Frederick J. Brousaides		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 59200 20930102	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Final rept. 1 Jul - 31 Dec 76		12. REPORT DATE December 1976	
		13. NUMBER OF PAGES 272	
		15. SECURITY CLASS. (of this report) Unclassified	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) 259p.			
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Wind Shear Atmospheric Effects Laser Doppler Velocimetry Remote Sensing Fog			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A Laser Doppler velocimeter is an instrument for remote sensing of atmospheric wind. This report describes a test designed to validate the ability of the laser Doppler velocimeter to measure winds in fog. The test instrument was placed at Otis AFB for a test period of one month. It was operated during conditions of fog during the test period. Three-dimensional wind components were generated using three distinct computational algorithms. A description of the laser Doppler velocimeter and computational algorithms is presented. Wind measurement results and a discussion of those results is also given. Because the laser Doppler velocimeter used for the test is a research instrument, recommendations are made for improvement for a system designed to remotely measure winds in fog.			

210105

# NOTICE

This document is disseminated under the sponsorship of the Air Force Geophysics Laboratory in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Use of trade names of manufacturers in this report does not constitute an official endorsement of such products or manufacturers, either expressed or implied by Lockheed Missiles & Space Company, Inc., or any agency of the United States Government.

1. TITLE		
2. AUTHOR		
3. PERIODICITY		
4. DISTRIBUTION STATEMENT		
5. SECURITY CLASSIFICATION		
6. ABSTRACT		
7. INDEXING		
8. OTHER		
9. TOTAL		
10. TOTAL		
11. TOTAL		
12. TOTAL		
13. TOTAL		
14. TOTAL		
15. TOTAL		
16. TOTAL		
17. TOTAL		
18. TOTAL		
19. TOTAL		
20. TOTAL		
21. TOTAL		
22. TOTAL		
23. TOTAL		
24. TOTAL		
25. TOTAL		
26. TOTAL		
27. TOTAL		
28. TOTAL		
29. TOTAL		
30. TOTAL		
31. TOTAL		
32. TOTAL		
33. TOTAL		
34. TOTAL		
35. TOTAL		
36. TOTAL		
37. TOTAL		
38. TOTAL		
39. TOTAL		
40. TOTAL		
41. TOTAL		
42. TOTAL		
43. TOTAL		
44. TOTAL		
45. TOTAL		
46. TOTAL		
47. TOTAL		
48. TOTAL		
49. TOTAL		
50. TOTAL		
51. TOTAL		
52. TOTAL		
53. TOTAL		
54. TOTAL		
55. TOTAL		
56. TOTAL		
57. TOTAL		
58. TOTAL		
59. TOTAL		
60. TOTAL		
61. TOTAL		
62. TOTAL		
63. TOTAL		
64. TOTAL		
65. TOTAL		
66. TOTAL		
67. TOTAL		
68. TOTAL		
69. TOTAL		
70. TOTAL		
71. TOTAL		
72. TOTAL		
73. TOTAL		
74. TOTAL		
75. TOTAL		
76. TOTAL		
77. TOTAL		
78. TOTAL		
79. TOTAL		
80. TOTAL		
81. TOTAL		
82. TOTAL		
83. TOTAL		
84. TOTAL		
85. TOTAL		
86. TOTAL		
87. TOTAL		
88. TOTAL		
89. TOTAL		
90. TOTAL		
91. TOTAL		
92. TOTAL		
93. TOTAL		
94. TOTAL		
95. TOTAL		
96. TOTAL		
97. TOTAL		
98. TOTAL		
99. TOTAL		
100. TOTAL		

## PREFACE

This final report is a description of the technology used and results obtained in a test intended to verify the feasibility of using laser Doppler velocimetry for measurement of low speed winds in fog. The test was conducted by personnel of Lockheed Missiles & Space Company, Inc., Huntsville Research & Engineering Center. Lockheed-Huntsville personnel contributing to this effort were E. J. Gorzynski, G.M. Miller and K.R. Shrider. The dedicated efforts during the test phase of Dr. Alan I. Weinstein and Frederick J. Brousaides of the Air Force Geophysics Laboratory are gratefully acknowledged.

## CONTENTS

Section		Page
	PREFACE	3
1	INTRODUCTION AND SUMMARY	7
	1.1 Background	7
	1.2 Program Objectives	8
	1.3 Report Format	8
2	LASER DOPPLER SYSTEM DEVELOPMENT	9
	2.1 System Description	9
	2.2 Winds Aloft Sensing	21
3	DATA PROCESSING FOR WIND MEASUREMENT	31
	3.1 Description of LDV Software System	31
	3.2 Data Processing Algorithms for Wind Measurement	39
4	DATA COLLECTION AND ANALYSIS	51
	4.1 Test Description	51
	4.2 Data Presentation	52
	4.3 Data Analysis	59
5	CONCLUSIONS AND RECOMMENDATIONS	79
6	REFERENCES	81
 Appendixes		
A	Sample LDV Signatures for Operation in the VAD Mode at Otis AFB, Massachusetts - September 1976	A-1
B	Tabular Data for Wind Measured at Otis AFB, Massachusetts, in Fog Conditions During September 1976	B-1
C	Tabular Data for Wind Measured in Low Cloud Conditions at Lockheed Missiles & Space Company, Huntsville, Alabama, on 7 December 1976	C-1

## Section 1 INTRODUCTION AND SUMMARY

### 1.1 BACKGROUND

Significant effort is currently being devoted to development of instrumentation to remotely sense atmospheric flow phenomena. Some of the avenues being pursued are active and passive acoustic sensors, optical sensors, and radio methods. A useful survey of such methods is presented in Ref. 1. Two advantages of remote sensors are that flow conditions can be ascertained in regions of space where it would not be convenient to locate instrumentation hardware, and no interference with the flow at the point of interest is introduced by their use. The laser Doppler velocimeter (LDV) is a particularly attractive device for remote sensing of atmospheric phenomena. In the LDV system, the laser radiation backscattered by moving particulates in the atmosphere is used to determine the velocity of the flow. Since it is possible to direct the laser focal volume at a selected sequence of points in space, data from a scanning LDV system can be used to determine the velocity field rapidly and over a range of altitudes. A CO<sub>2</sub> laser Doppler velocimeter system has the following advantages over other remote sensing techniques: (1) the position of the volume within which velocity is sensed can be varied with ease as only optic pointing and focusing operations are involved; (2) the ambient aerosol provides a sufficient scattering target; and (3) the sensing mechanism is non-mechanical which results in the potential for a high frequency turbulence sensor.

The feasibility of using a laser Doppler velocimeter (LDV) system for the remote sensing of low altitude winds and for the detection and tracking of aircraft wake vortices has been demonstrated (Refs. 2 through 6). The particular application for which the test described herein was conducted is the measurement of wind in fog. The accurate measurement of wind in fog is necessary for successful application of fog dispersal systems to dissipate

fog at military bases. The accurate measurement of low speed wind is particularly important.

## 1.2 PROGRAM OBJECTIVES

The primary objective of the test was to verify the ability of the LDV to measure low speed winds in both advection fog and radiation fog. It was also desired to define particular potential system or operating modifications which could be employed to improve low speed wind measurement capability in a system specifically designed for such purposes. An adjunct objective was an evaluation of the feasibility of measuring visibility with the LDV by measuring the attenuation of the laser signal. The results of that feasibility evaluation are not reported herein. However, the adjunct purpose of the test is discussed because it affected the manner in which the wind measurement data were taken.

## 1.3 REPORT FORMAT

A brief description of laser Doppler velocimetry and the Lockheed-Huntsville Mobile Atmospheric Unit is presented in Section 2. Section 3 contains a description of the mathematical algorithms used to measure winds. The tests conducted at the Air Force Geophysics Laboratory Test Site at Otis AFB, Massachusetts are described in Section 4 with a presentation and discussion of results.

## Section 2

### LASER DOPPLER SYSTEM DEVELOPMENT

#### 2.1 SYSTEM DESCRIPTION

An LDV wind/vortex sensor senses air movement by measurement of the Doppler frequency shift of laser radiation backscattered by the atmospheric aerosol. An instrument must incorporate means to transmit the laser radiation to the region of interest, collect the radiation scattered from the atmospheric aerosol and to photomix the scattered radiation and a portion of the transmitted beam on a photodetector. The difference between the transmitted frequency and the returned frequency is the Doppler shift frequency. The Doppler frequency shift signal is generated at the photodetector and is translatable into an along-optic axis wind velocity component using appropriate electronics. The magnitude of the Doppler shift,  $\Delta f$ , is given by the equation

$$\Delta f = \frac{2}{\lambda} |\vec{V}| \cos \theta$$

where

$|\vec{V}|$  = the velocity vector in the region being sensed

$\lambda$  = the laser radiation wavelength, and

$\theta$  = the angle subtended by the velocity vector and the optic system line of sight.

A Doppler shift of 188 MHz results per m/sec of line-of-sight velocity component. Thus measurement of the Doppler shift frequency,  $\Delta f$ , yields directly the line-of-sight velocity component  $|\vec{V}| \cos \theta$ . Some typical advantages of the laser Doppler method are: (1) the Doppler shift is a direct absolute measure of the velocity (for example, the hot wire yields velocity via a cooling effect on the wire), (2) the ease with which the position of the sensing volume can be varied (optics pointing and focusing operations only being involved); (3) the ambient aerosol provides sufficient scattering, thus enabling operation

in "clear air" conditions; and (4) the ambient aerosol tracer has a small inertia and responds quickly to variations in airspeed and is thus a good turbulence indicator.

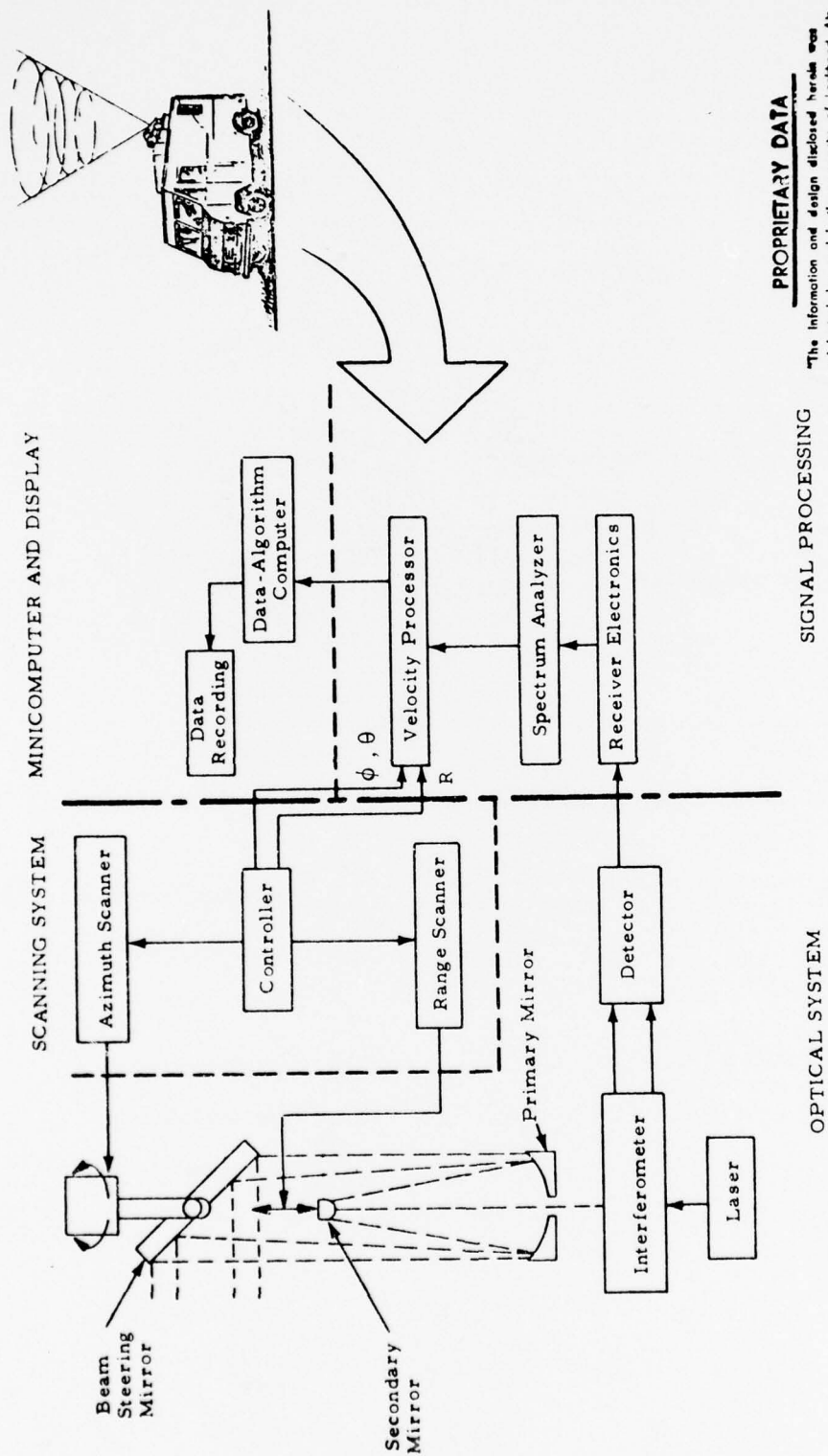
A useful instrument must also incorporate means of scanning the system's sensing volume in the desired manner and to also effect the required signal processing, on-line read-out and permanent recording requirements.

The hardware implementation of the field laser Doppler unit utilized during this investigation is discussed in the following subsections. The overall configuration is summarized in Fig.2-1.

#### 2.1.1 Basic LDV Optical System

The optical system is of a monostatic design and utilizes a continuous wave laser. This arrangement depends on focusing the transmitter telescope at the location of interest for its spatial resolution property. Details of the optical arrangement are shown in Fig.2-2.

Specifically, a horizontally polarized, 20-watt, continuous wave CO<sub>2</sub> laser beam (10.6 micron wavelength) emerges from the laser (1) and is deflected 90 degrees by a mirror (3). The approximately 6 mm diameter beam then passes through a Brewster window (4) and a CdS quarter waveplate (5) which converts it to circular polarization. The beam impinges on the secondary mirror (6) and is expanded and reflected into the primary mirror (30 cm diameter) (7) and then focused out into the atmosphere. A small portion of the original laser beam is reflected by the secondary mirror and the Brewster window (4) and is used as a reference frequency on the photodetector (10). Energy scattered by aerosols, at the focal volume (8) is collected by the primary mirror (7), collimated by the secondary (6), and passed through the quarter waveplate (5). The quarter waveplate changes the polarization of the aerosol backscattered radiation from circular to vertical linear polarization. The vertically polarized beam is approximately



**PROPRIETARY DATA**

The information and design disclosed herein was originated by and is the property of Lockheed Aircraft Corporation. Lockheed reserves all patent, proprietary, design, manufacturing, reproduction, use, and sale rights herein, and to any article disclosed herein, except to the extent rights are expressly granted to others. The foregoing does not apply to vendor proprietary parts.

SIGNAL PROCESSING

OPTICAL SYSTEM

Fig. 2-1 - System Configuration

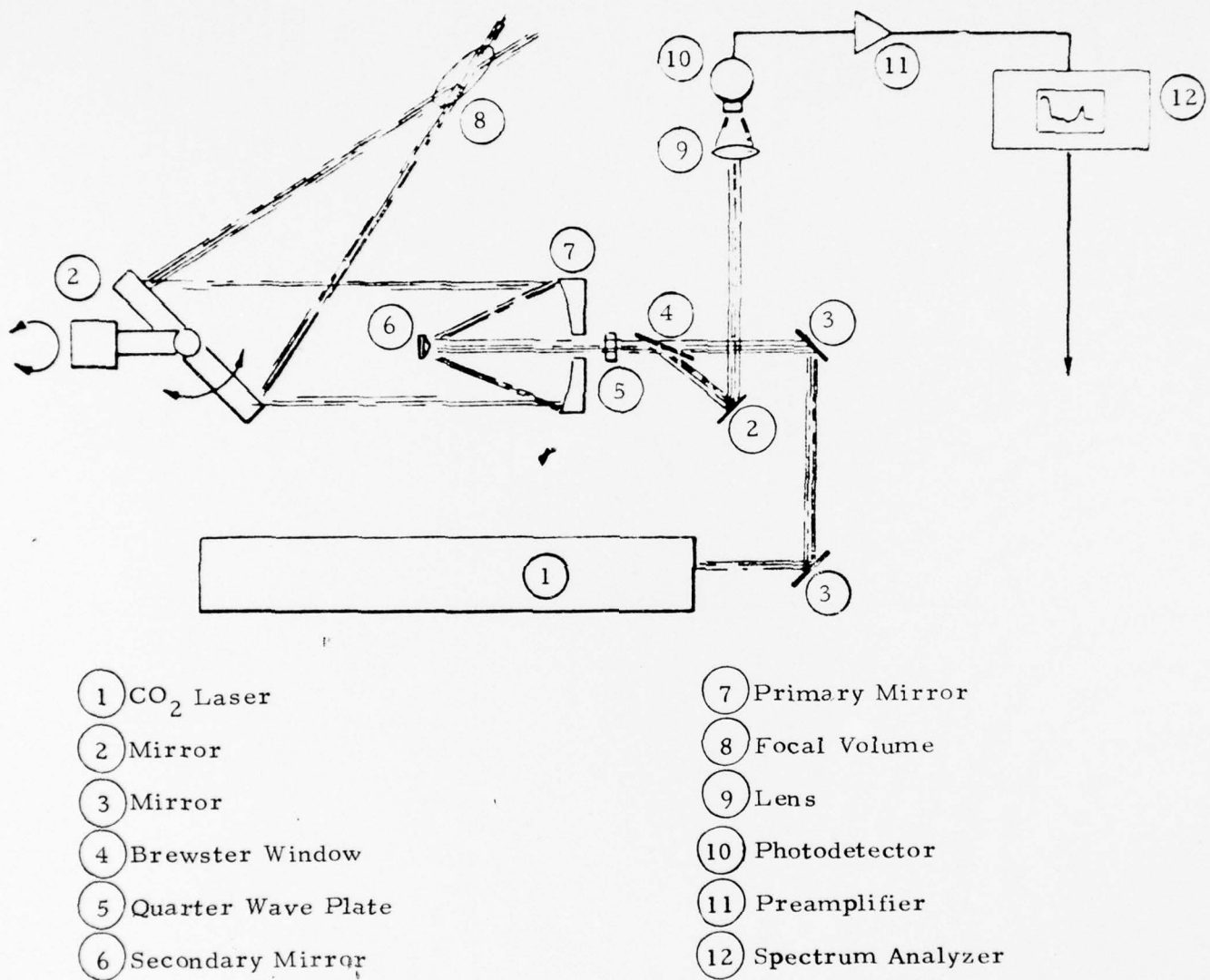


Fig. 2-2 - Optical Component Configuration of the Lockheed LDV

78% reflected off the Brewster window (4). After passing through the collecting lens (9) the two beams are photomixed on the detector (10) in a heterodyne configuration. The electrical output of the detector (10) is amplified (11) with a 5 MHz bandwidth, 20 dB gain low noise type preamplifier and fed into a spectrum analyzer (12).

### 2.1.2 Optic Scanning System

In order to provide the flexibility required to operate the various required modes, a scanning arrangement as shown in Fig.2-3 is utilized. The required modes of operation include vortex tracking (not required for the measurements described in this document) and velocity azimuth display (VAD) for measurement of atmospheric wind. The mirror assembly, AB, can be rotated about the vertical axis for scanning in azimuth necessary for the VAD (also called conical scan mode of operation). Mirror A is adjusted to control the elevation angle of the beam, thus controlling the cone angle of the conical scan. The scanning hardware as deployed on the mobile van is shown in Fig.2-4.

Range scanning of the system's focal volume is accomplished by varying the distance between the telescope secondary mirror, E, and the primary mirror, D. This is effected by varying the position of the mirror, E, in a controlled manner by an electric motor/optical encoder combination.

The operator inputs for the scanning system are made through a control panel incorporating thumbswitch controls and LED monitors. The system's scan capabilities is summarized in Table 2-1 and Fig.2-5, respectively.

### 2.1.3 Signal Processing System

The Doppler frequency shift of the photodetector output is ascertained through use of a sampled spectrum analyzer which provides frequency spectra (intensity of returned signal as a function of Doppler shift) at a rate of 70 signatures per second. A typical Doppler wind signature is shown in Fig.2-6.

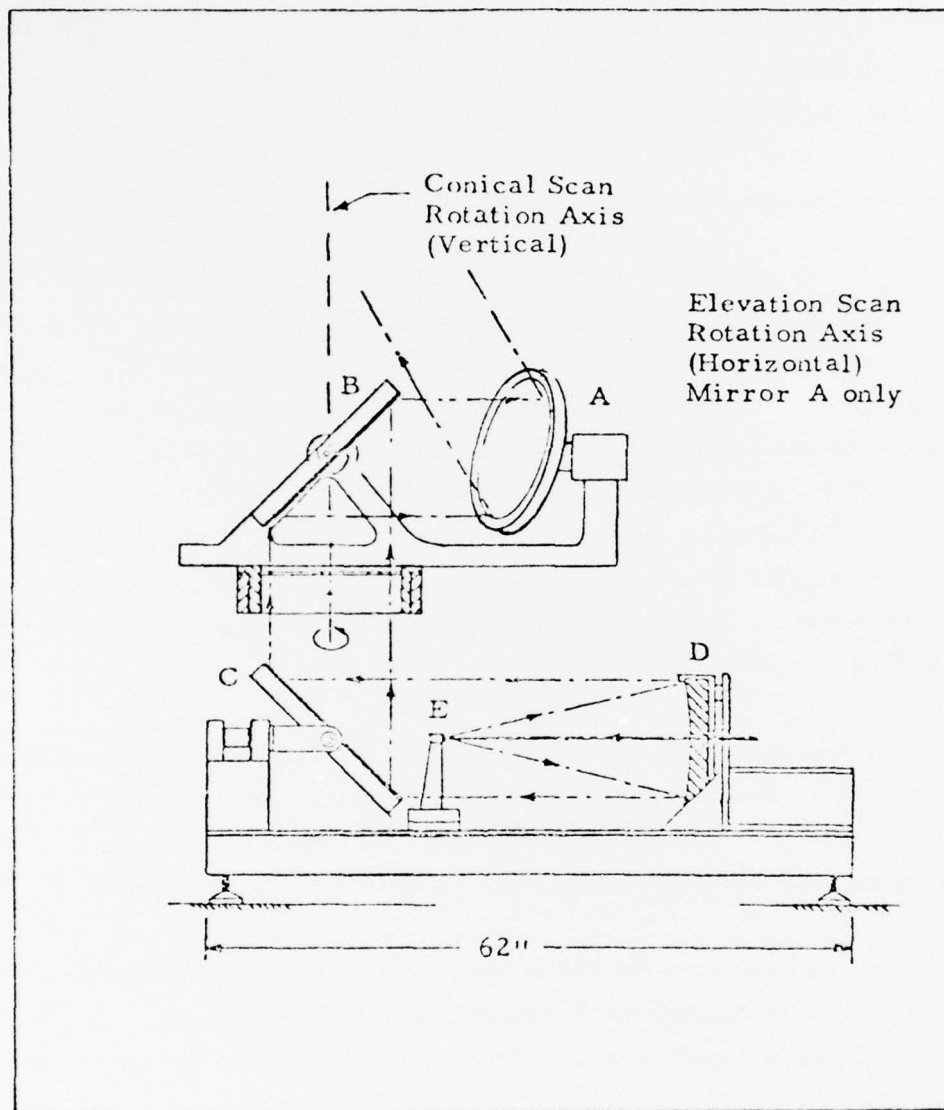


Fig. 2-3 - Schematic of Scan Equipment Added to LDV

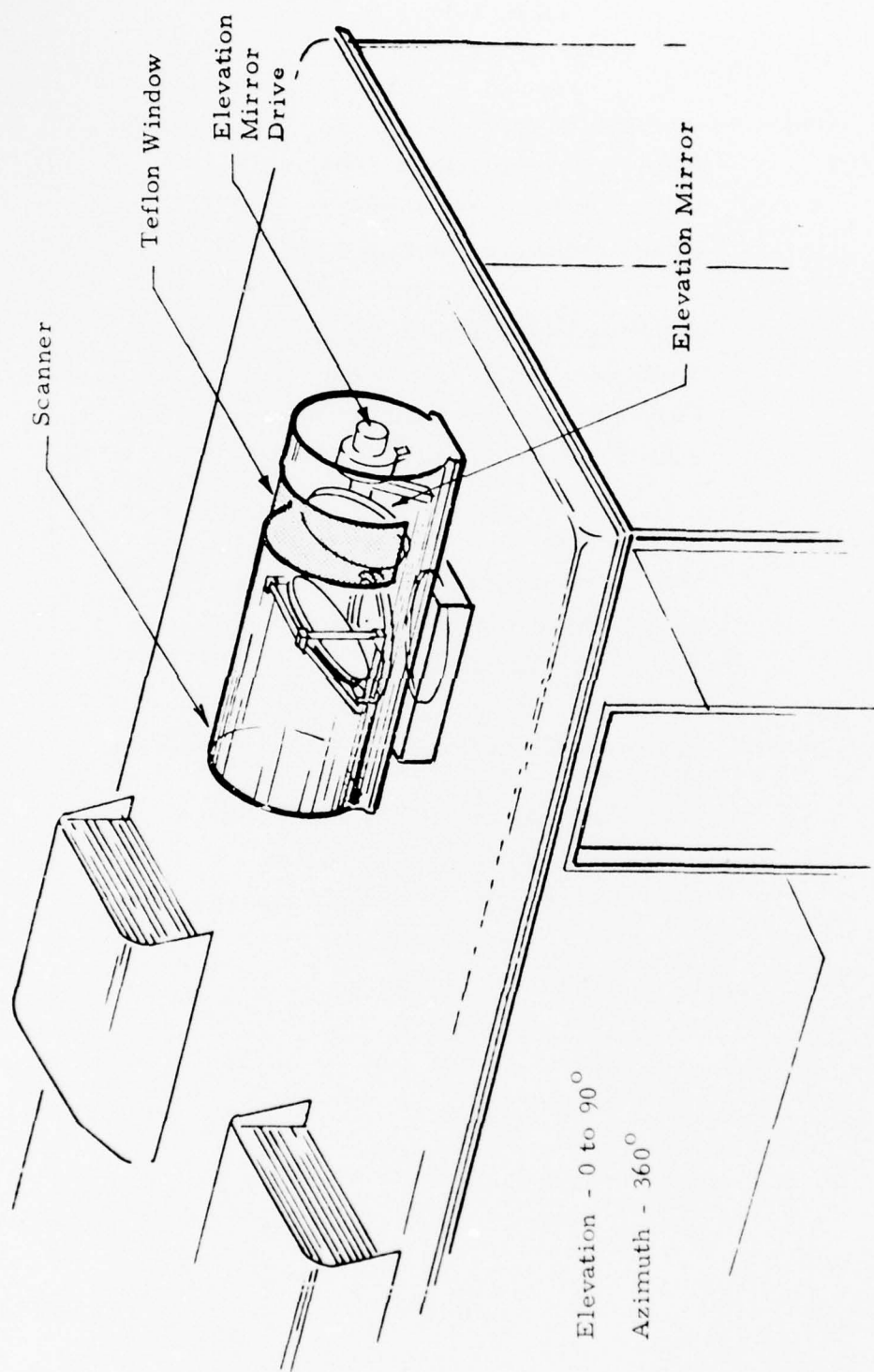


Fig. 2-4 - Multimode Scanner

Table 2-1  
SCAN CAPABILITIES

RANGE	Maximum Limit: 100 to 800 m Minimum Limit: 16 to 650 m Scan Frequency: 0.1 to 6.9 Hz
ELEVATION	Maximum Limit: 10 to 90 deg Minimum Limit: 0 to 90 deg Hard Limit: 3 deg with Override Scan Frequency: 0.1 to 0.5 Hz
VAD MODE	Measurement Altitude: 10 to 640 m Measurement Time/Altitude: 5 sec Sample Rate: 1 to 7 Cycles Number of Altitudes: 8
MULTIMODE	Elevation Coverage: 3 to 90 deg Upwind and Downwind Scan Plane Azimuth: 360 deg Vertical Line Scan: 16 to 640 m Overhead Arc Scan: 90 deg Coverage
ACCURACY	Range: 0.5 m at 500 ft

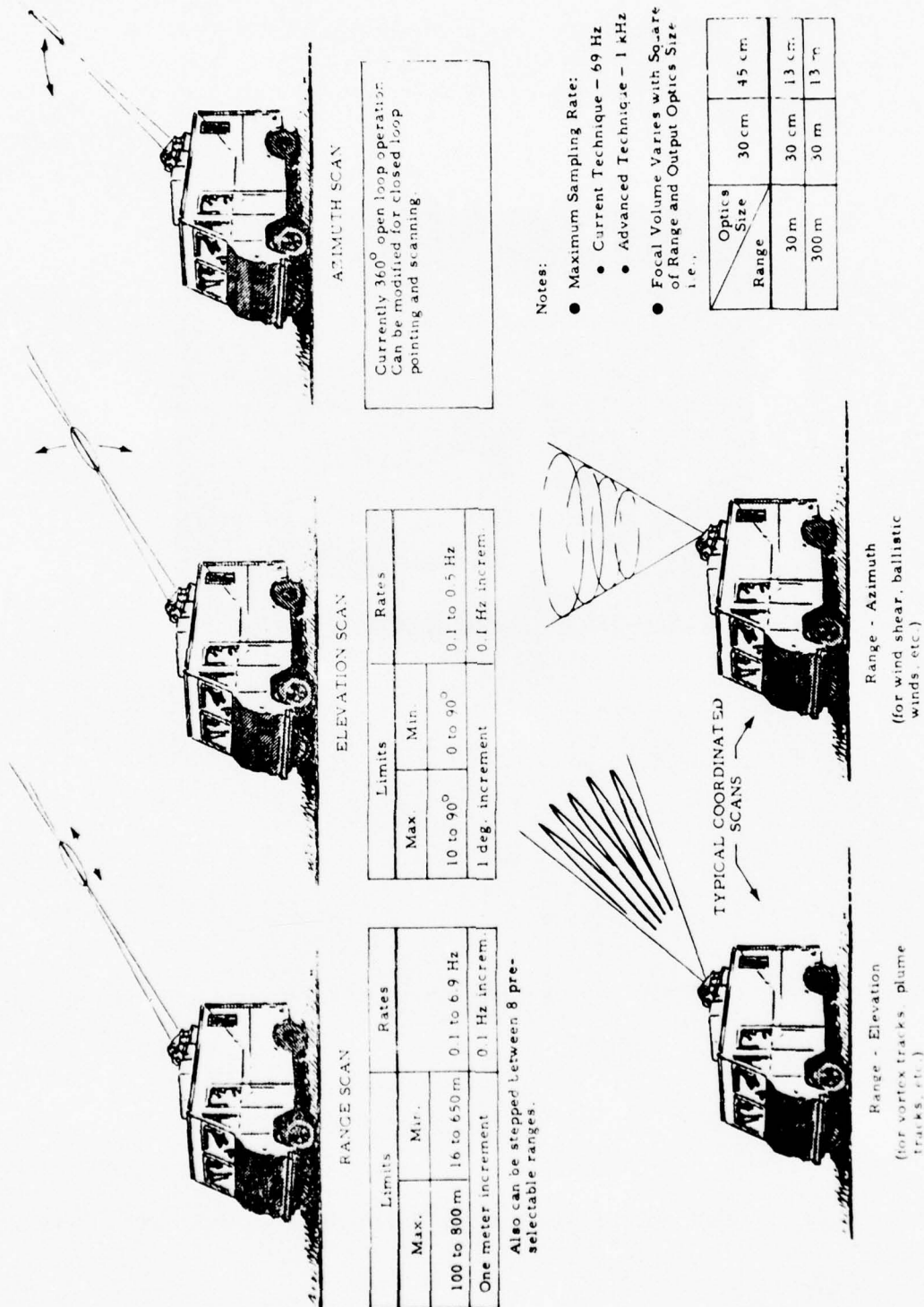


Fig. 2-5 - Scan Capabilities of LDV

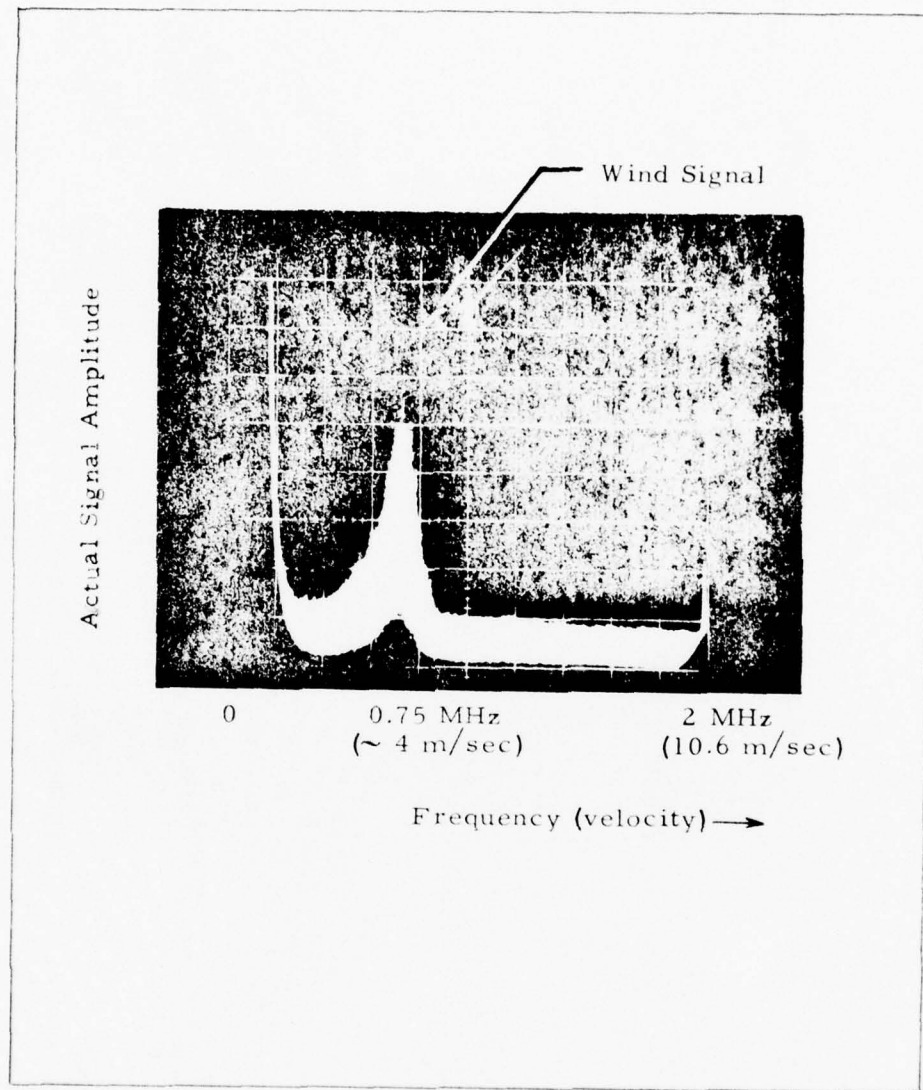
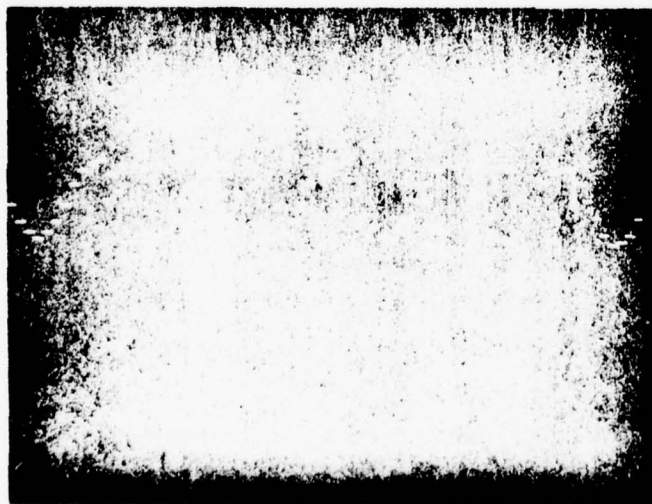


Fig.2-6 - Typical LDV Wind Signature as Displayed by a Spectrum Analyzer

To yield a line-of-sight velocity estimate, a voltage is made available which has the same time behavior as the Doppler shift,  $f_d$ , as given by the peak of the spectrum.

The implementation of this technique is, in essence, a recursive comparison method. The spectrum analyzer scan is driven by a sawtooth voltage derived from a D/A converter, the input to which is counter clocked at a constant rate, hence the digital number output of the counter represents frequency on a linear scale. At each new count, the spectrum analyzer output is converted to a digital representation by an A/D converter, and the binary number representing the current sample is compared with that obtained on the previous count. If the current one is the larger of the two, it is saved by storing in a latch, along with the binary number representing its frequency; if it is smaller, the previous one is retained until the next comparison. This process is continued for the entire sweep. It is evident that the number remaining in the frequency store latch, when the sweep is completed, corresponds to the highest signal power observed, i.e., the peak of the spectrum. At the end of each sweep, the new peak frequency found replaces that obtained on the previous sweep. An example of its output is shown in Fig.2-7 for the case of



$f_m = 5 \text{ Hz Sine Wave}$

Oscilloscope Data

Horiz. = .1 sec/div

Vert. = 1 V/div

Fig.2-7 - Output of Signal Processor for FM Modulated Input

an FM signal of center frequency 2.0 MHz ( $f_o$ ) modulated to  $\pm 200$  kHz about  $f_o$  at a 5 Hz rate sinusoidally.

A provision is included for tracking single sideband suppressed carrier signals, with an identification of upper or lower sideband such that when used in conjunction with an acousto-optic modulator the unit can discriminate the sign of the Doppler shift. The signal feedthrough at the translated frequency can also be discriminated against digitally, thus eliminating the need for a "notch filter."

The raw spectral information (output of the spectrum analyzer is also made available to the Systems Engineering Laboratories (SEL) 810A data logging minicomputer which is programmed to generate its own estimate of the spectral peak.

#### 2.1.4 Data Recording and Display

Primary: The primary data gathering function is performed by an SEL 810A general purpose minicomputer. Data gathering by the Mobile Atmospheric Unit is formatted by the computer software and stored on magnetic tape for subsequent processing on the Univac 1108. The SEL 7-track tape control and magnetic tape units allow digital recording of data at 800 bpi at 45 ips, which recording density is common to the Univac 1108 I/O system. The data logged by the computer includes:

- All scan volume location parameters
- "Mode of operation" identifier
- The instantaneous line-of-sight velocity information
- The Doppler spectrum peak strength
- Full spectrum intensity and frequency information (optical)
- A data quality identifier.

Properties of the Doppler spectrum, namely, the amplitude and frequency corresponding to the spectral peak are obtained as a result of on-line

computer processing except for the frequency which is also obtained by the spectral peak locator (velocity processor) discussed previously. The latter allows some flexibility for on-line operator displays (see below).

Secondary: The velocity processor output estimate of the instantaneous line-of-sight velocity, updated at a 70 Hz rate, is available in analog format which can be recorded directly on a strip chart recorder, an option which is extremely useful during the VAD mode of operation for monitoring the characteristic profile.

Some overall views of the mobile unit hardware as utilized during this program are shown in Figs. 2-8 through 2-11.

## 2.2 WINDS ALOFT SENSING

Using the basic system outlined previously it is possible, by scanning operations, to determine the three-component wind field at any specified altitude between 50 and 2000 feet. The scanning method employed is commonly referred to as the velocity azimuth display\* (VAD) technique which was first utilized by Lhermitte and Atlas in conjunction with a microwave radar.

The telescope is focused at the altitude of interest, the beam being directed at a zenith angle,  $\beta$ . The beam is then scanned in azimuth, thus tracing out a circle at the selected altitude (Fig. 2-12).

The instantaneous line-of-sight component of velocity within the sensing volume as measured by the LDV,  $v_r$ , is given by

$$v_r = v_h \sin\beta \cos(\theta - \theta_o) + w \cos\beta$$

$v_h$  and  $\theta_o$ , respectively, being the speed and direction of the horizontal wind motion and  $w$  the vertical motion at the height being sampled. The azimuthal

---

\* Also known as conical scan technique because of beam scanning configuration.



Fig. 2-8 - MAU Monitoring Wake Vortex Generated by L-1011 at Huntsville Airport

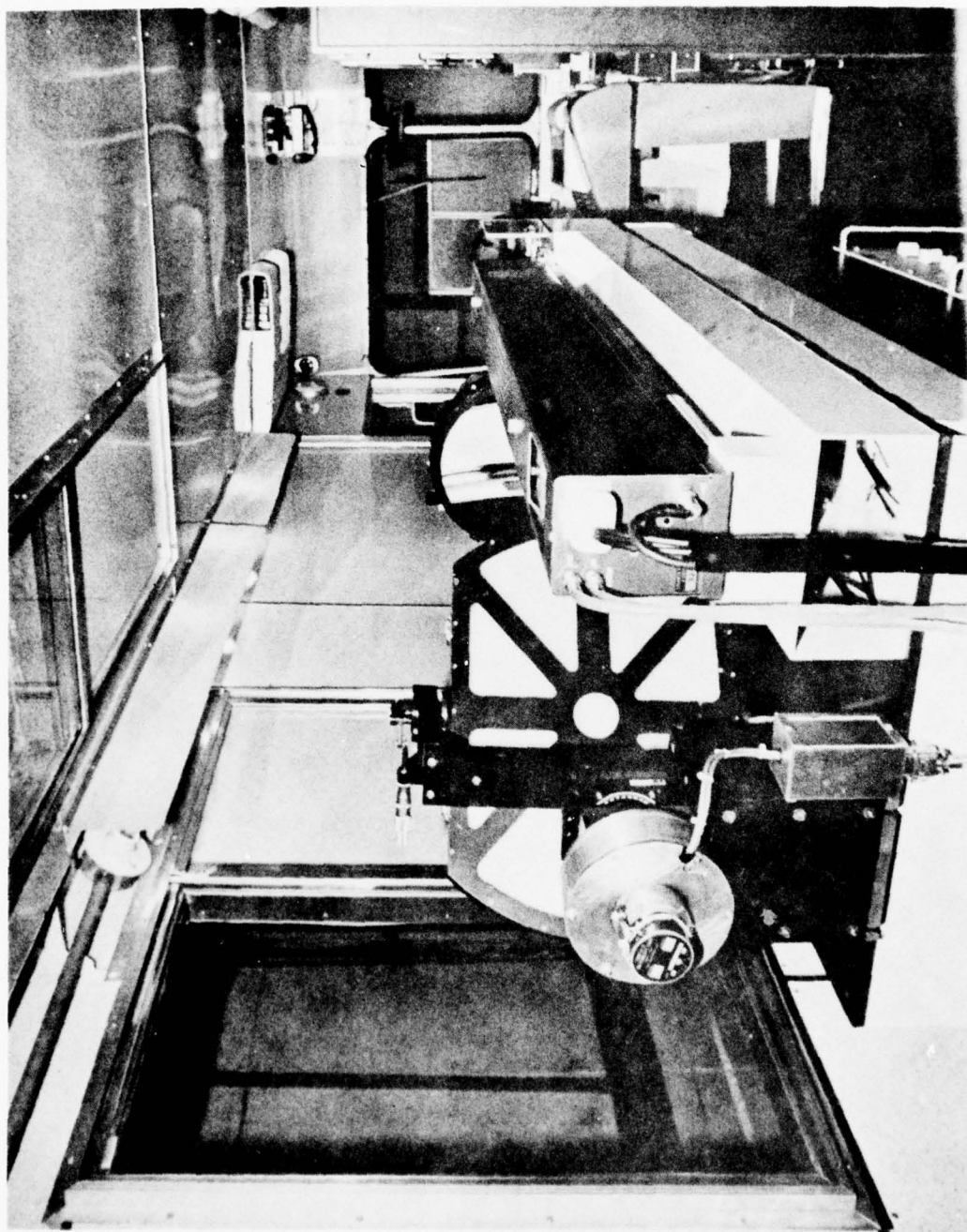


Fig. 2-9 - Interior View of MAU Looking Forward (Depicted in foreground is elevation scanning mirror on left and laser on right.)

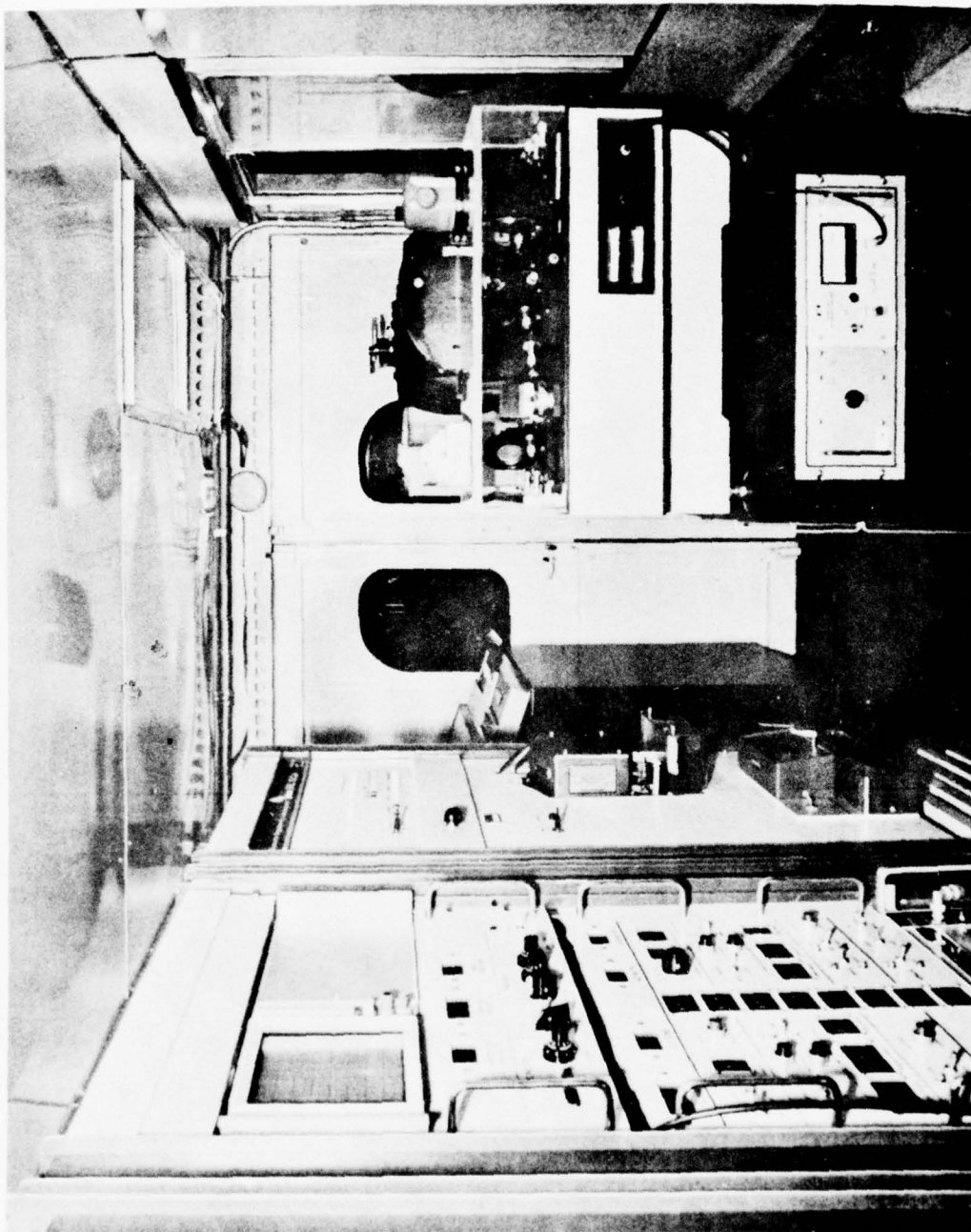


Fig. 2-10 - Interior View of MAU Depicting Display and Scanner Controls in First Rack, Computer in Second Rack, Digital Tape Unit Aft and Optics Package on Right

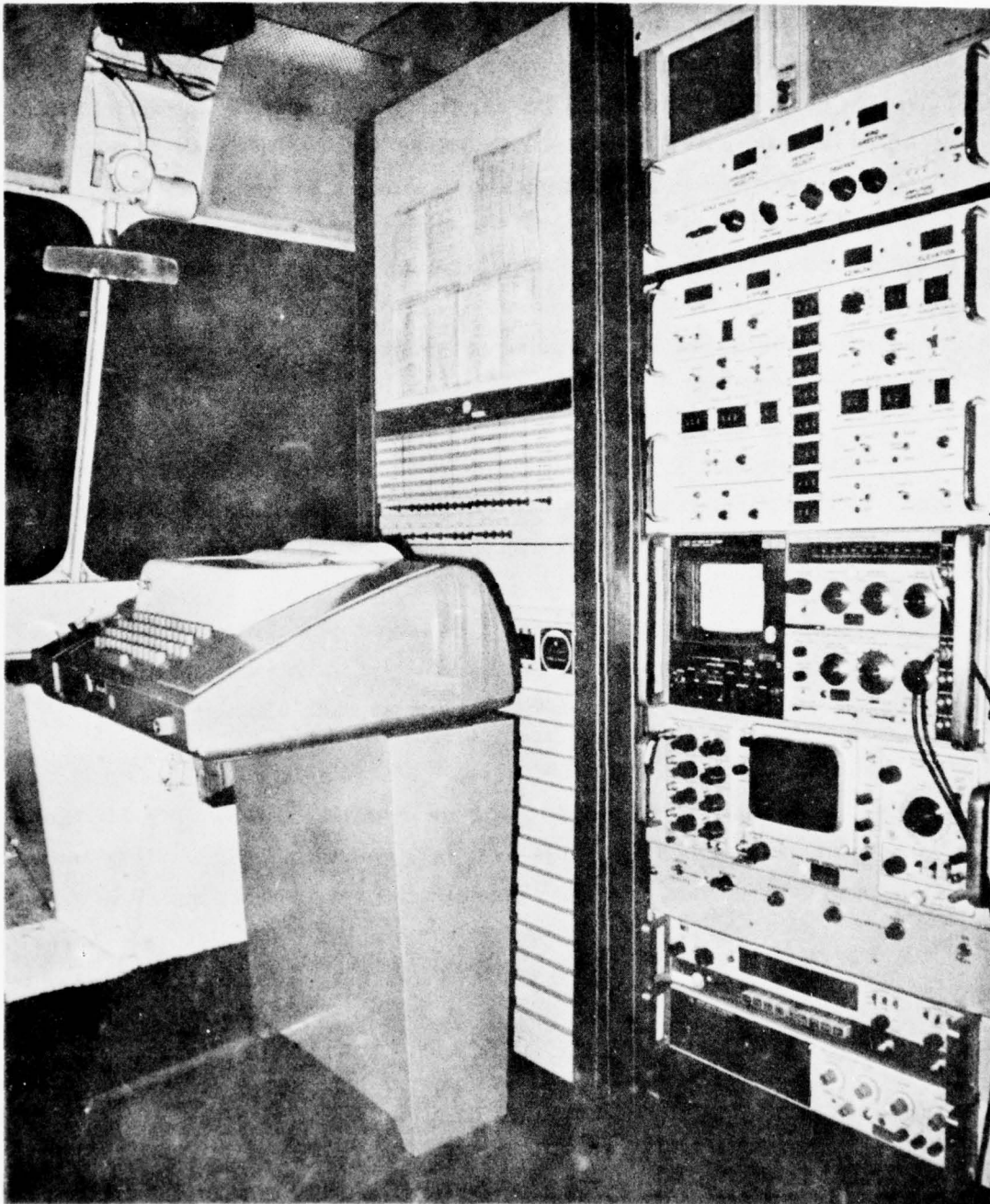


Fig. 2-11 - Computer Mainframe Teletype and LDV Electronics

dependence of  $v_r$  is sufficient to yield the horizontal speed and direction and vertical component of velocity, respectively.

In the present mode of operation, the system is unable to distinguish between positive and negative values of  $v_r$ . Therefore, it is the absolute value of  $v_r$  ( $|v_r|$ ) that is sensed. This results in a signal as shown in Fig. 2-13 instead of the sinusoidal signal as shown in Fig. 2-12. This results in an ambiguity of 180 deg in the wind direction since it is uncertain which peak in Fig. 2-13 represents looking into the wind. In practice, no problem occurs because the operator records approximate wind direction, and the data processing technique can then calculate exact wind direction. This resolves all wind direction ambiguities if the operator's input estimate is within  $\pm 89$  deg of the true wind direction.

While operating in the VAD mode the system is capable of measuring winds at  $n$  ( $n = 1$  through 8) altitudes (that can be dialed in by using thumb-switches) in sequence over a total time period of  $5np$  sec where

5 sec = time for conical sweep at one altitude  
 $n$  = number of altitudes to be interrogated  
 $p$  = number of VAD scans at each altitude  
(can be chosen to be 1 through 7).

During this investigation  $n = 2$ ,  $p = 1$  were utilized, thus allowing the measurement of wind at two altitudes every 10 seconds. Alternating between the two altitudes (28m and 43m) was performed for the test duration required.

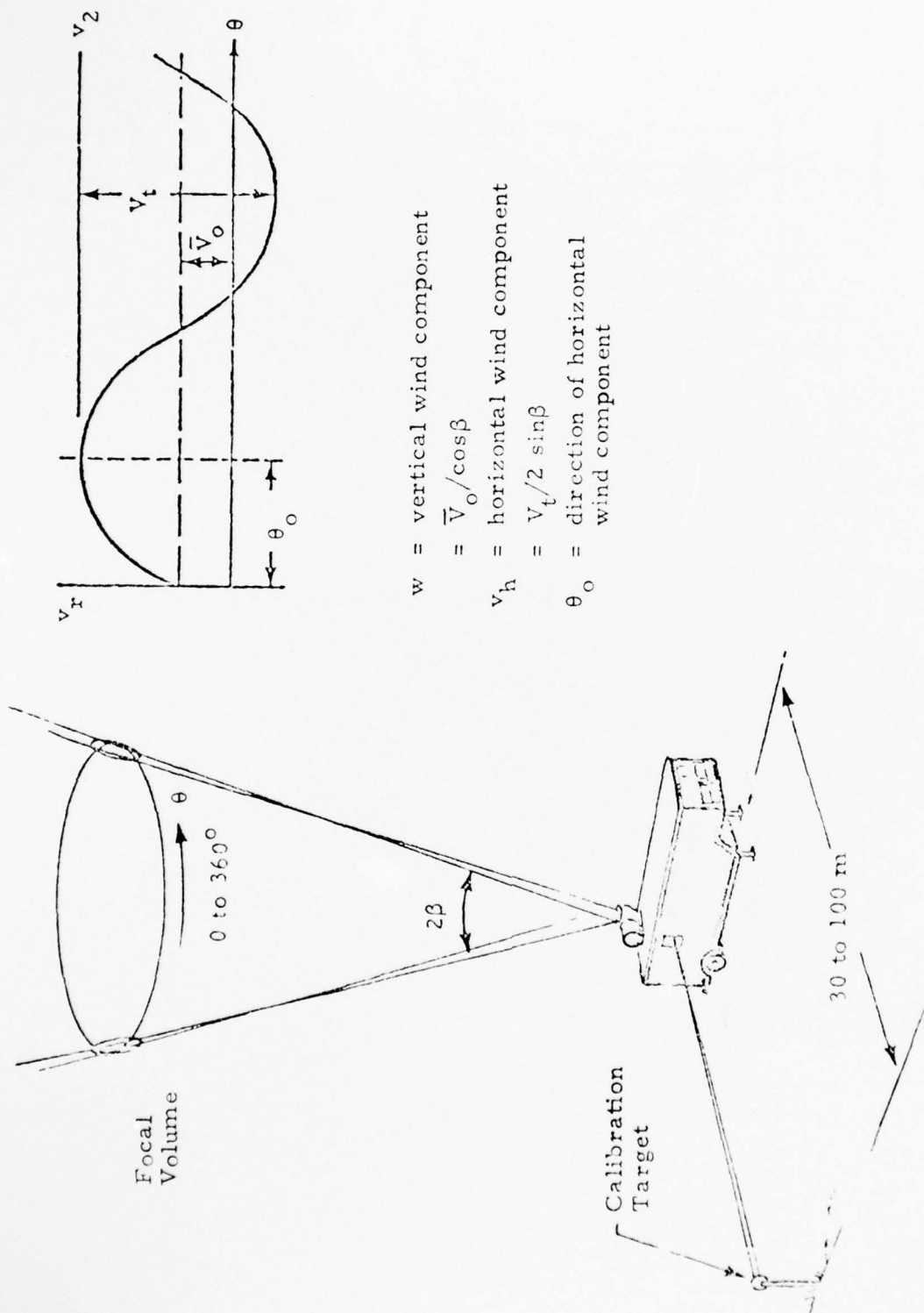


Fig. 2-12 - Principle of VAD Operation

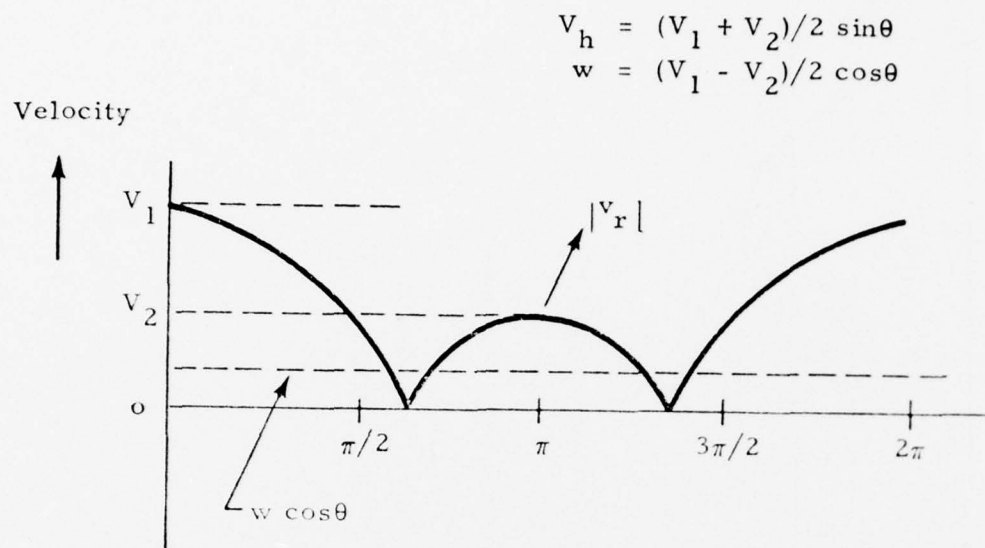


Fig. 2-13 - Azimuth Angle Dependence of Measured Velocity Component

### Section 3

## DATA PROCESSING FOR WIND MEASUREMENT

Acquisition and processing of the LDV signature is accomplished by means of a compact data handling system developed specifically for the Lockheed-Huntsville MAU. The general elements of the MAU data acquisition and data processing system are shown in Fig. 3-1. The digitized LDV intensity versus frequency signal along with its coordinates in space is fed into the SEL 810 minicomputer. Reprocessing of the LDV signal is carried out on the minicomputer utilizing on-line computer programs written in SEL machine language. Information from the SEL 810 is stored on magnetic tape and is used as an input to the off-line processing algorithms. Off-line processing of the LDV signal is carried out on a Univac 1108 computer with programs written in FORTRAN language and using card inputs with information from the logs to supplement the data. The flow of data from the MAU is sketched in Fig. 3-2 showing both the on-line and off-line data processing routines. On-line manipulation of the data is carried out by the SEL Data Logger program. The off-line processing is carried out by the VAD and Vortex Track program. The final output consists of printouts and plots. A description of the data logger, and the VAD program and their operational characteristics is given in the following sections.

### 3.1 DESCRIPTION OF LDV SOFTWARE SYSTEM

Data acquisition in the Mobile Atmospheric Unit is carried out by the SEL Data Logger program. A sweeping spectrum analyzer is used to detect the Doppler shift frequency. A diagram of the output of the spectrum analyzer is shown in Fig. 3-3. The output of the spectrum analyzer is the value of signal intensity for each of one hundred frequency bands spanning the entire frequency scale. The data logger on the SEL computer records the signal intensity for each frequency band for which the Doppler frequency shift exceeds the velocity

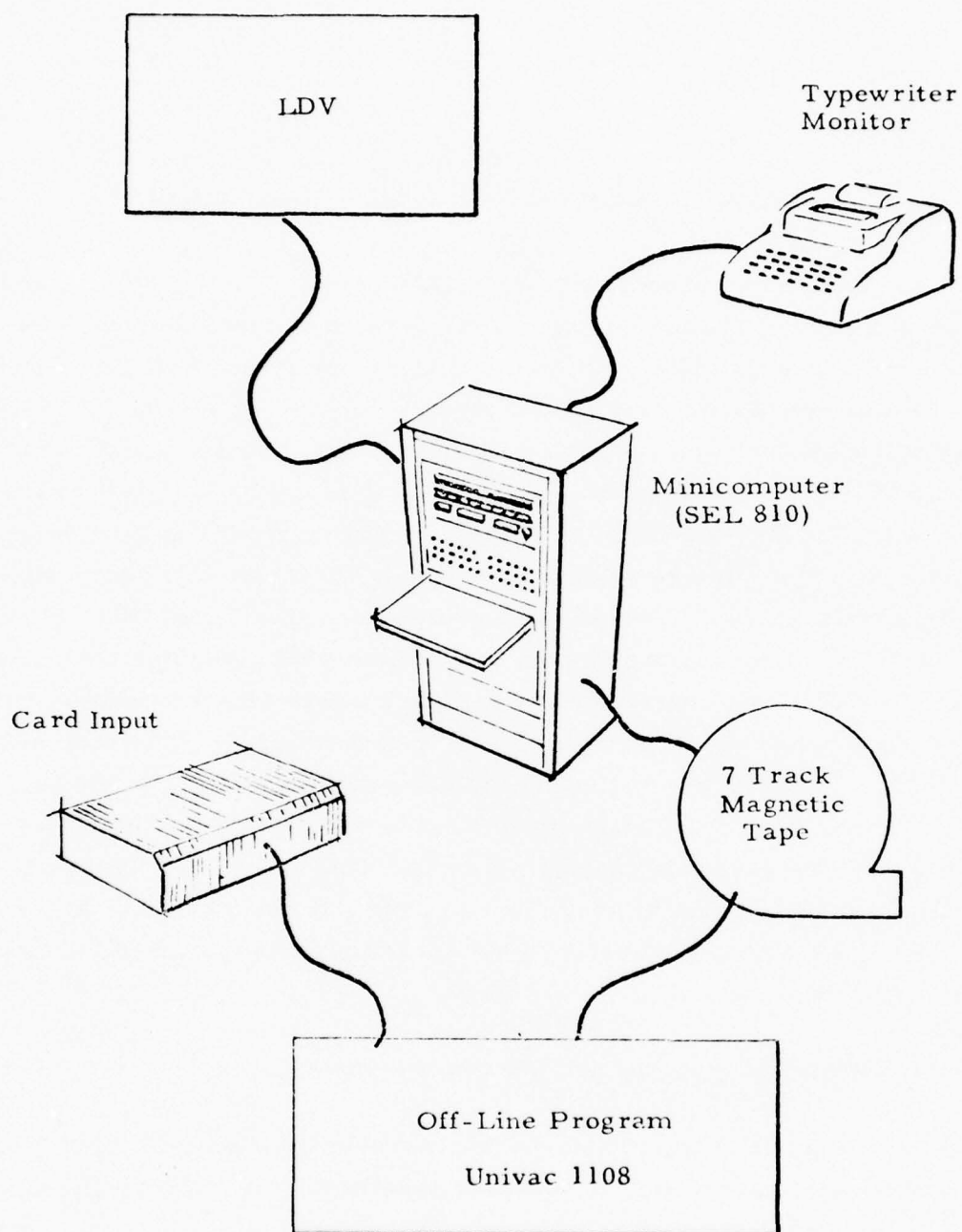


Fig. 3-1 - General Elements of MAU Data Acquisition and Data Processing System

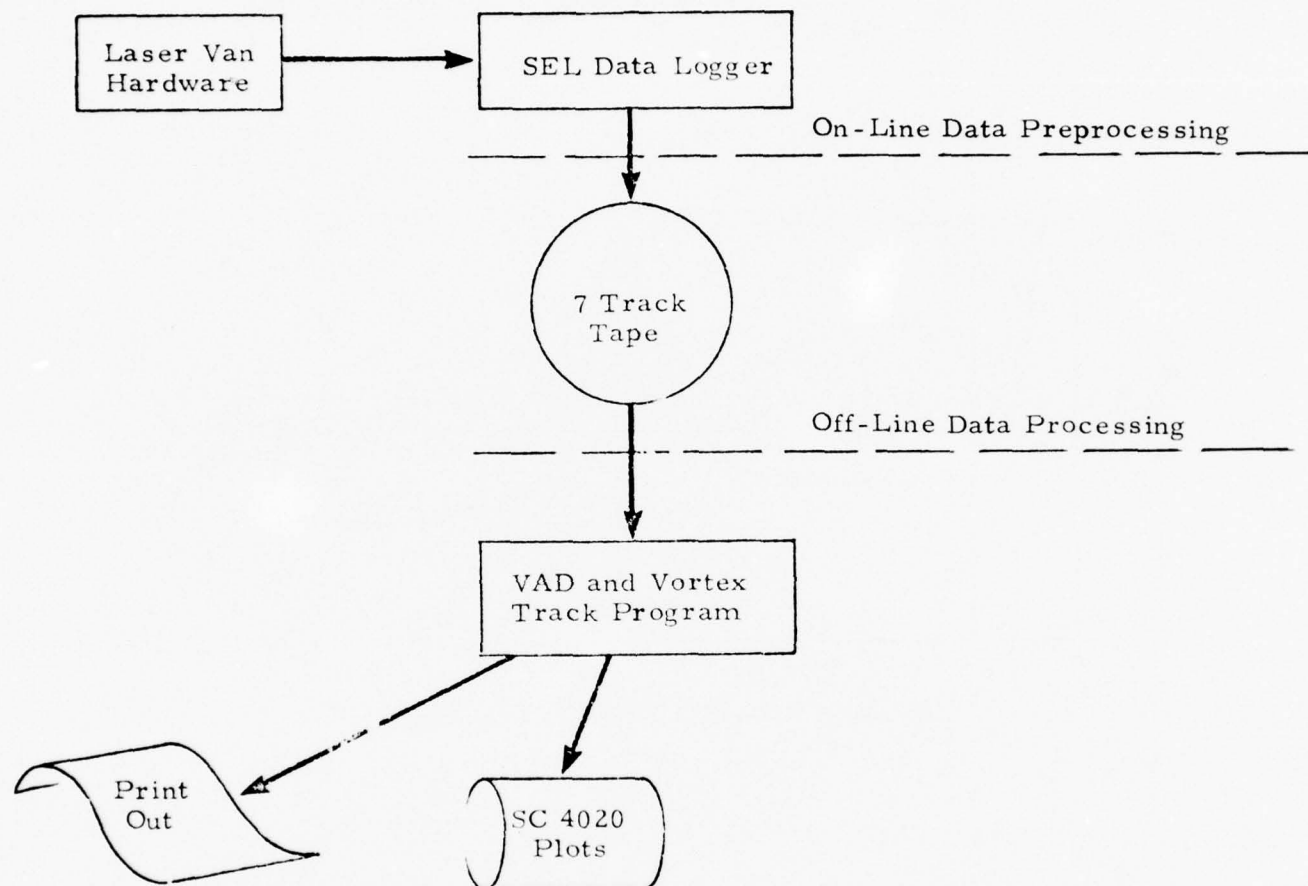


Fig. 3-2 - Data Flow from Mobile Atmospheric Unit

$V_{pk}$  = Highest velocity detectable above amplitude threshold

$V_{ms}$  = Velocity corresponding to maximum signal intensity

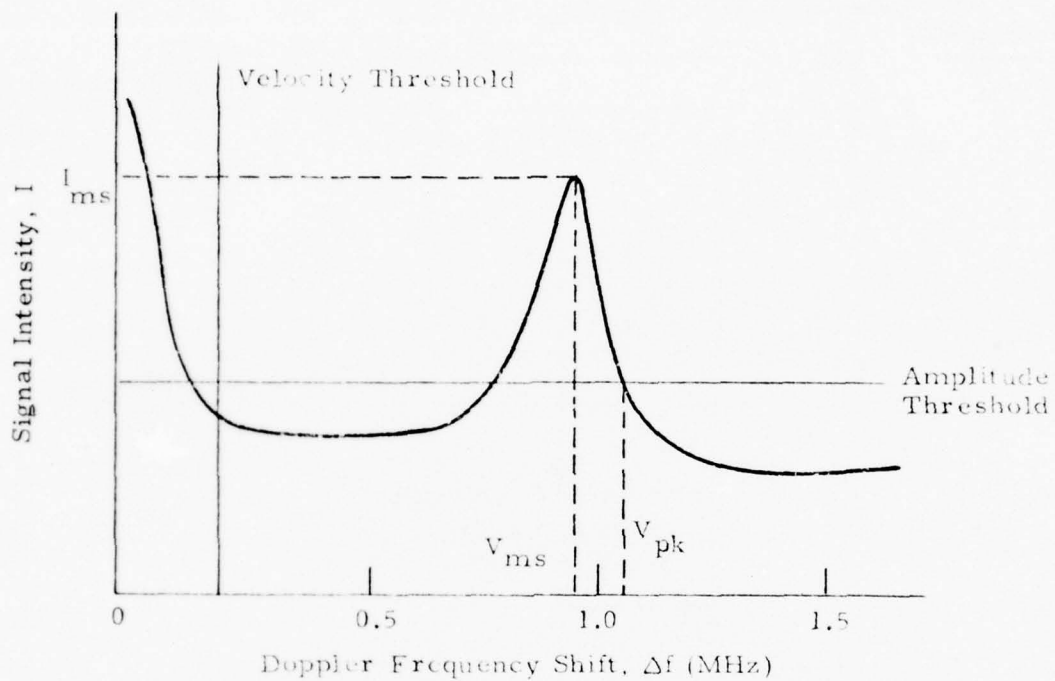


Fig. 3-3 - Typical Spectrum Analyzer Output in VAD Scan

threshold and the signal intensity exceeds the amplitude threshold. This data is stored on magnetic tape for off-line processing. A flow diagram of the data logger is shown in Fig. 3-4.

An off-line conversion program identifies the frequency band with the maximum amplitude LDV signal. This program saves the maximum amplitude LDV signal,  $I_{ms}$ , and its corresponding frequency,  $V_{ms}$ , which is above both the amplitude and frequency thresholds. The definition of  $I_{ms}$  and  $V_{ms}$  and the shape of the characteristic LDV spectrum is shown in Fig. 3-3. It can be seen that  $V_{ms}$  is the characteristic velocity associated with the flow phenomenon. The output from the off-line conversion program consists of  $V_{ms}$  as a function of time and spatial coordinates of the sensing volume. From the output of this program the wake vortex velocity field or wind field can be reconstructed using an additional off-line processing routine.

The two-step process used to generate  $V_{ms}$  as a function of time and space was necessitated by the adjunct purpose of relating laser attenuation to visibility. The output tape of the data logger is to be used for the data analysis of that study. In the more usual situation of wind measurement (i.e., when laser attenuation data are not needed) the two steps are accomplished in a one-step process using the SEL 810 computer. The output of the SEL computer in that case is identical with that of the off-line conversion program described above. The flow chart for this data logger is shown in Fig. 3-5.

Final processing of the LDV measurements is carried out by the VAD and Vortex Track program. A macro flow chart of the VAD and Vortex Track program is shown in Fig. 3-6. The VAD processing for wind measurement and vortex tracking algorithm are contained in the same program. Vortex tracking was not used in this test. In this off-line program the array of  $V_{max}$  values which is a function of time and space is processed to yield the three-dimensional wind field (VAD mode) or the aircraft wake vortex trajectories (vortex mode). The processing of the VAD measurements involves the computation of the  $u, v, w$  wind components from the characteristic sinusoidal

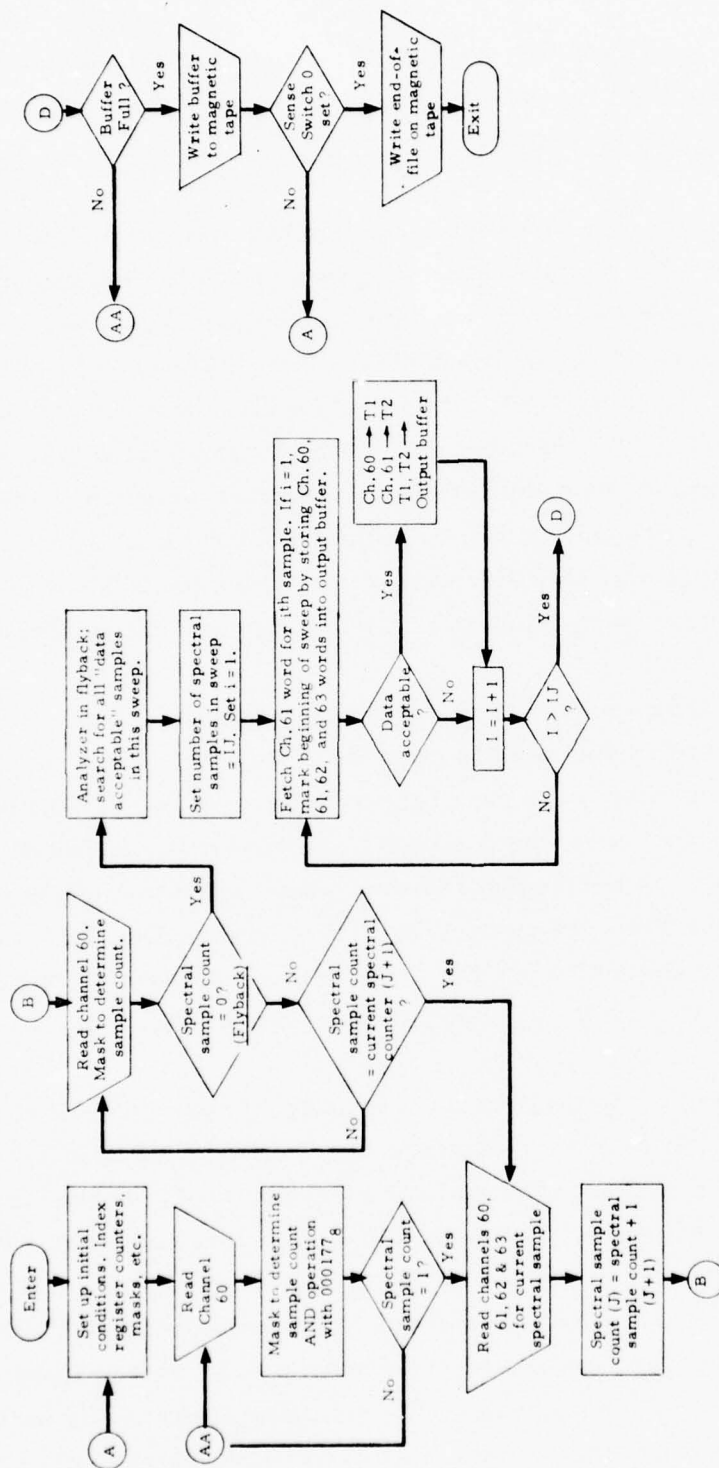


Fig. 3-4 - Full Spectrum Data Logger Macro Flow Chart



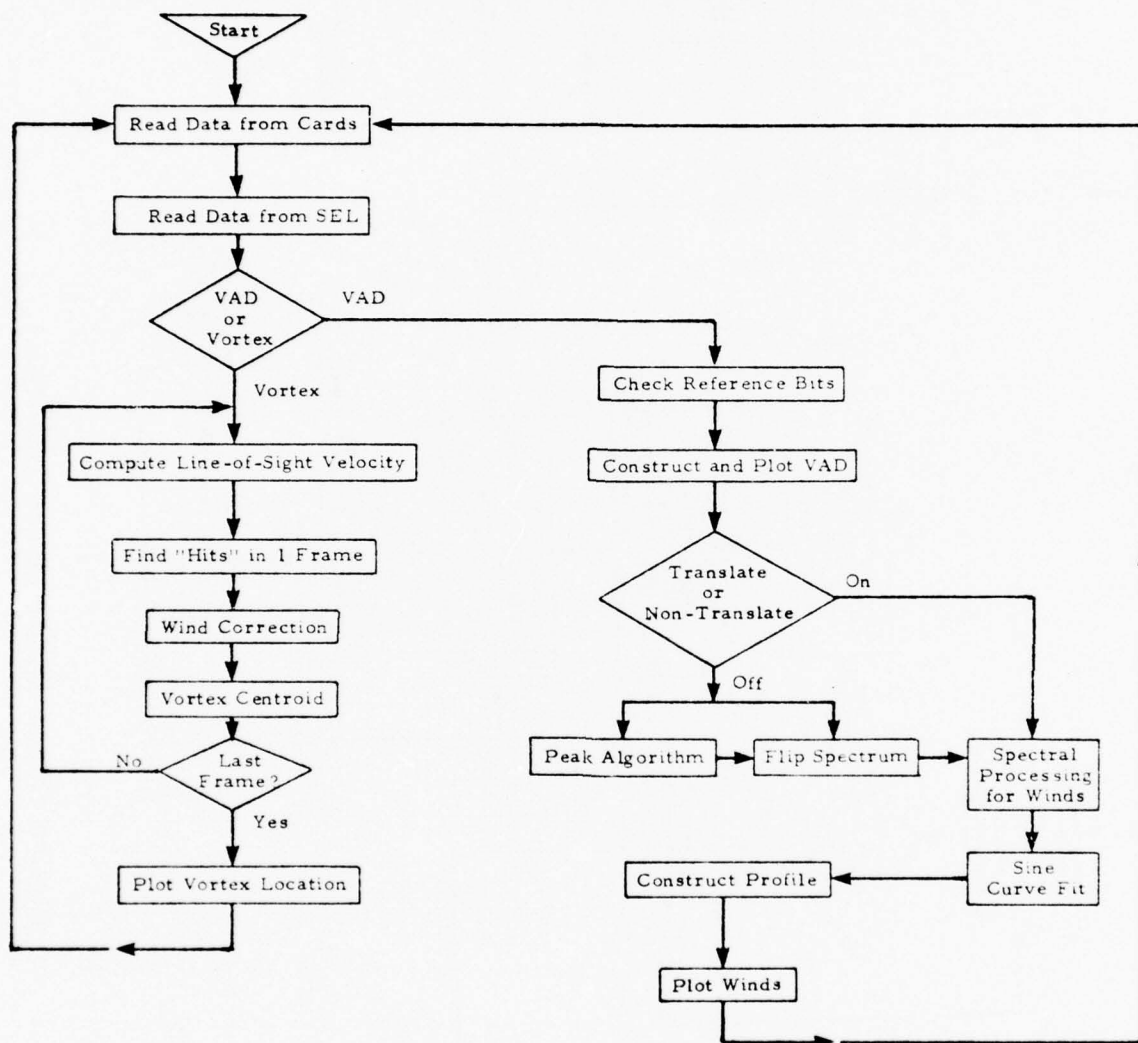


Fig. 3-6 - Macro Flow Chart of VAD and Vortex Program

VAD LDV signature discussed earlier in Section 2 and is described in more detail in Ref. 5. The program is geared to handle both the translated and non-translated LDV signal. A translated signal is provided when the LDV system includes a frequency translator, which distinguishes between positive and negative values of line-of-sight velocity. A non-translated signal provides only the absolute value of line-of-sight velocity as shown in Fig. 2-13. However, during the course of this research effort all of the data acquisition and data processing was done in the non-translate mode. Three basic techniques have been implemented to compute the three-dimensional wind components as follows: (1) a peak algorithm where the magnitude and location of the peak signal in the sinusoidal LDV VAD signature is used to compute the velocity components; (2) a spectral processing for the winds using the derectified signal; and (3) a sine curve fit. The final output is a plot (and printout) of the u, v and w velocity components as a function of altitude and time.

### 3.2 DATA PROCESSING ALGORITHMS FOR WIND MEASUREMENT

Lockheed-Huntsville has developed three algorithms for calculating the mean wind speed and direction from the VAD signature. For each of these algorithms, mean wind and direction is calculated for each 5 second VAD sweep. Standard deviations of wind speed and direction can be calculated from multiple VAD sweeps. The data output of the LDV system operating in the VAD mode are line-of-sight velocities measured at a selected number (usually 350 in the current Lockheed system) of distinct points around the VAD cone. We recall that the line-of-sight velocity signature is theoretically sinusoidal in the VAD mode (cf., Fig. 2-12).

For all of the processing algorithms, preprocessing of the data occurs; this preprocessing includes:

1. Save line-of-sight velocities for one rotation of scanner
2. If two or more rotations occur at the same altitude, average with previous rotations
3. Assign azimuth angle to each point (assuming constant rotation rate)

4. Edit points to eliminate spurious points
5. Plot line-of-sight velocity versus azimuth angle.

The edit criterion for the elimination of spurious points is that the  $i^{\text{th}}$  point is eliminated if

$$|v_{r,i} - v_{r,i+1}| > .2 v_{r,i+1}$$

and

$$|v_{r,i} - v_{r,i-1}| > .2 v_{r,i-1}$$

A sample plot of unedited line-of-sight velocity versus azimuth angle is shown in Fig. 3-7.

### 3.2.1 Peak Algorithm

For the calculation of wind velocity by the peak algorithm, the calculation procedure is

1. Filter data with an  $n$  point moving average
2. Identify the two peak velocity points,  $V_{p1}$  and  $V_{p2}$  that occur at a minimum of 90 deg apart
3. Compute horizontal component of wind velocity

$$V_h = \frac{V_{p1} + V_{p2}}{2 \sin \beta}$$

4. Compute horizontal wind angle with help of estimated wind direction
5. Compute vertical component of wind velocity

$$w = \frac{V_{p1} - V_{p2}}{2 \cos \beta}$$

6. Derectify VAD signal if no translator is present and plot derectified signal

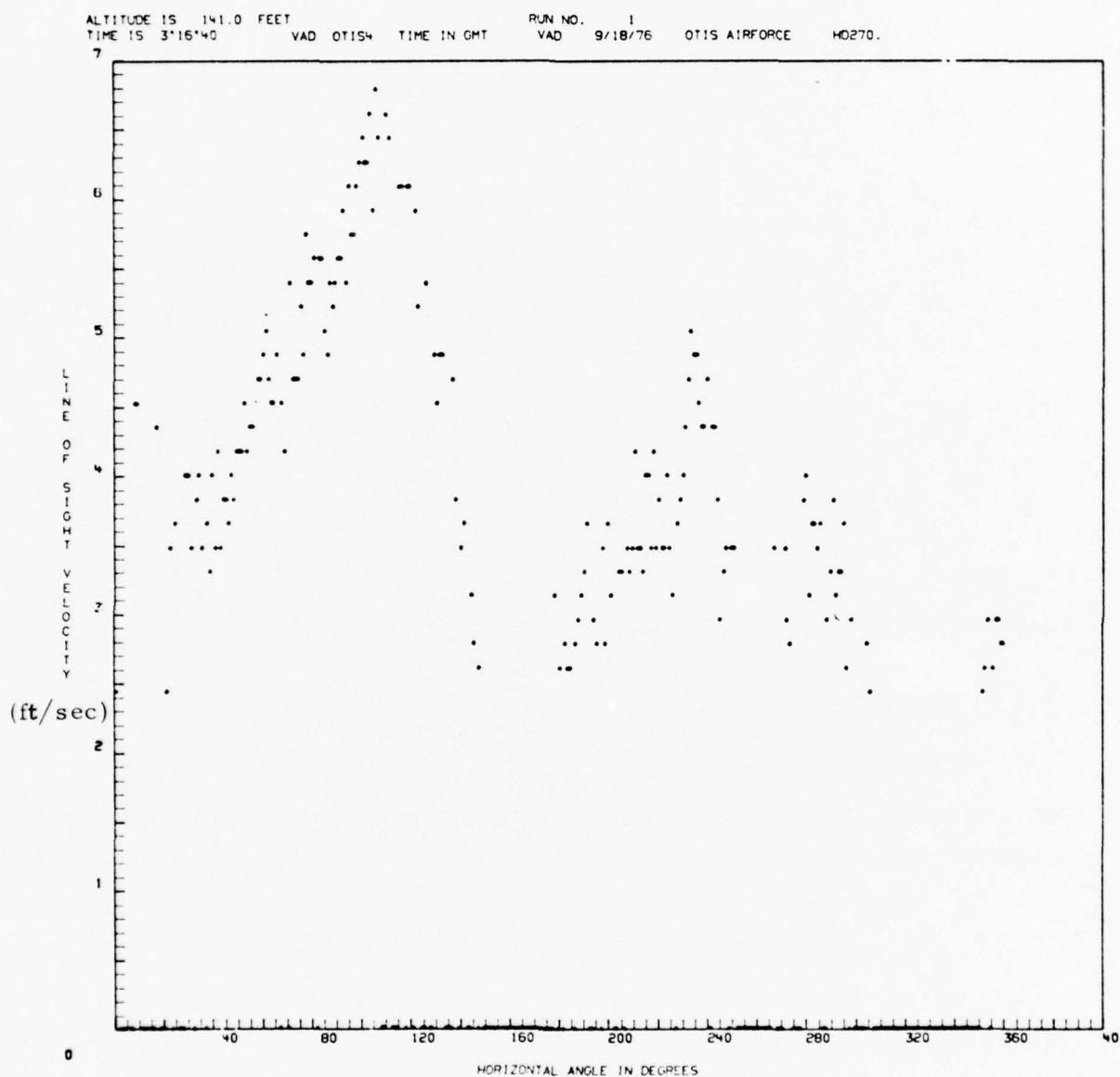


Fig. 3-7 - Sample Output Plot from the VAD and Vortex Track Program  
Operating in the VAD Mode

The individual data points are filtered with an  $n$  point moving average filter ( $n$  is usually 21). Thus, each line-of-sight point is filtered by

$$\bar{V}_{r,i} = \left[ V_{r,i-\frac{n-1}{2}} + \dots + V_{r,i-1} + V_{r,i} + V_{r,i+1} + \dots + V_{r,i+\frac{n-1}{2}} \right] / n$$

where  $\bar{V}_{r,i}$  is the filtered value of line-of-sight velocity to be used in further calculations. A plot of the filtered line-of-sight velocities for a 21 point filter is shown in Fig. 3-8. Additional samples of the LDV signature (including raw data, filtered data, and derectified data) are presented in Appendix A.

When the LDV data are measured, an approximation of the wind angle is recorded. The calculated wind angle is the azimuth angle of the peak which is closer to the estimated wind angle. The wind angle plus 90 deg is the angle at which the line-of-sight velocity is theoretically zero. This angle is used for the derectification of the line-of-sight signal. A plot of the derectified (edited but unfiltered) line-of-sight velocity is presented in Fig. 3-9.

### 3.2.2 Fourier Coefficient Algorithm

The Fourier coefficient algorithm (or spectral algorithm) computes the fundamental harmonic of the line-of-sight velocity. The Fourier series for a generalized periodic function is

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} \left( a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

where the Fourier coefficients are given by

$$a_n = \frac{2}{L} \sum_{i=1}^L V_i \cos \left( \frac{2\pi i n}{L} \right)$$

$$b_n = \frac{2}{L} \sum_{i=1}^L V_i \sin \left( \frac{2\pi i n}{L} \right)$$

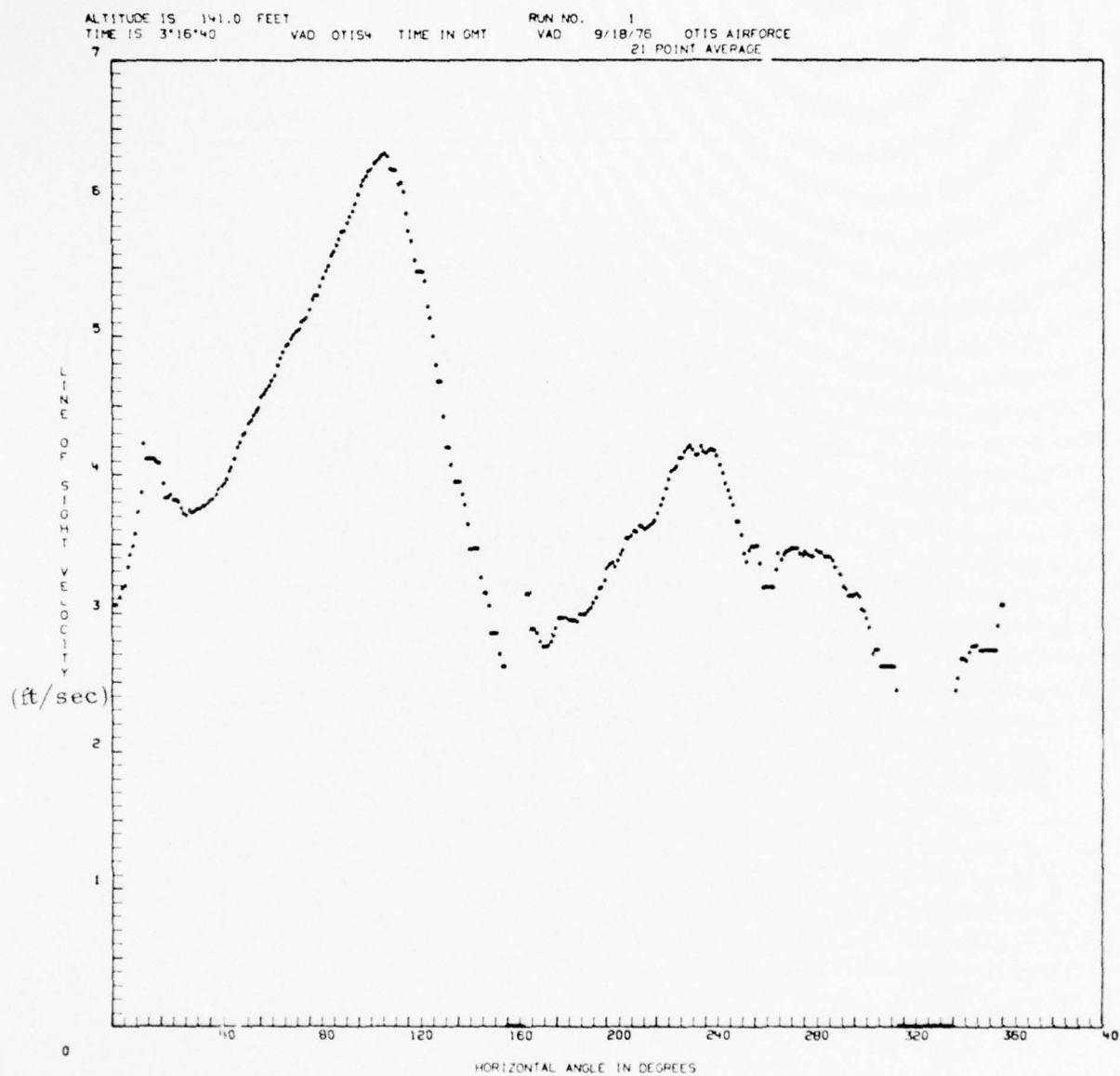


Fig. 3-8 - Filtered Line-of-Sight Velocity for VAD Mode

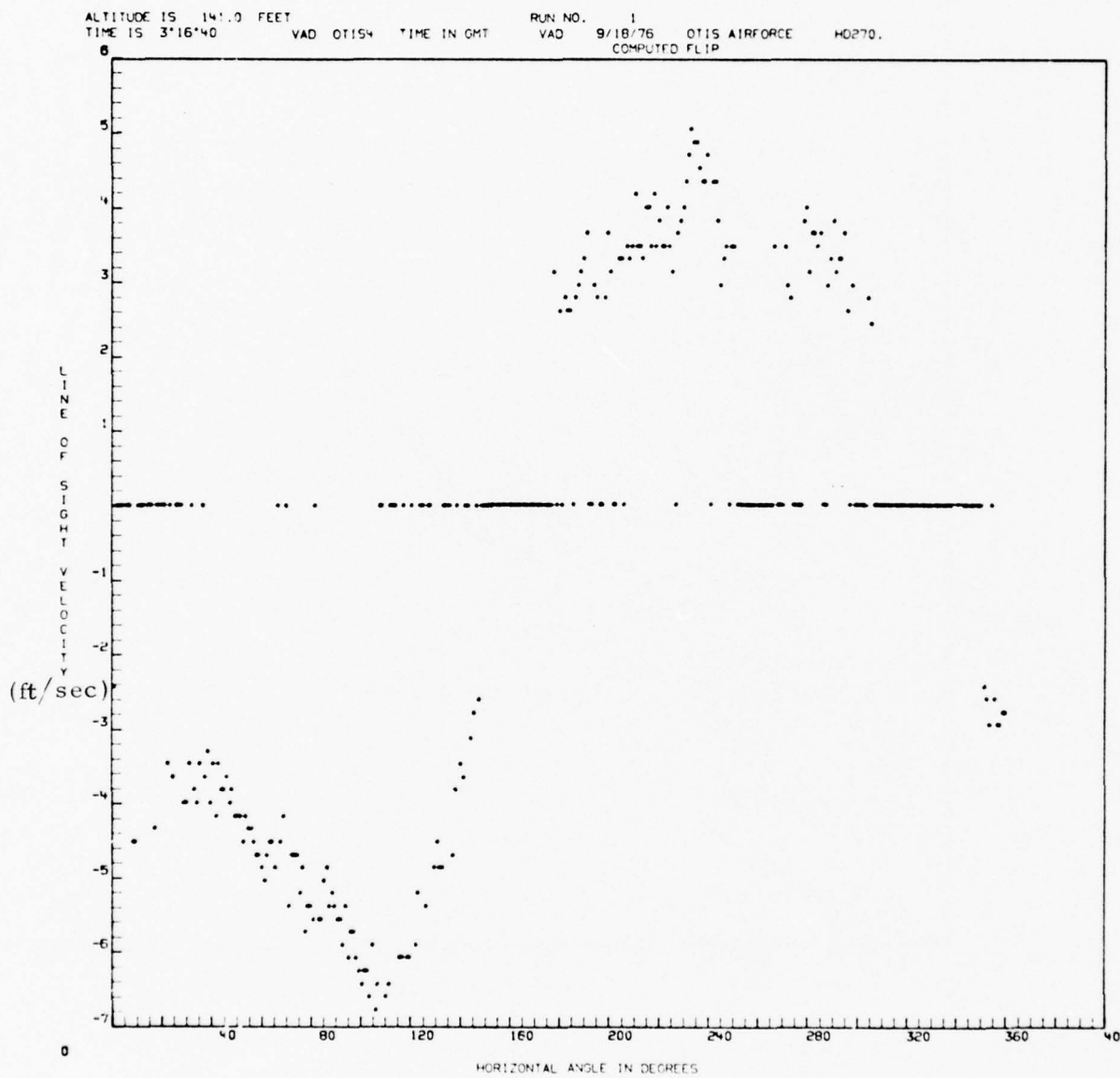


Fig. 3-9 - Derectified Line-of-Sight Velocity for VAD Mode

where the  $L$  discrete points are uniformly spaced between 0 and  $2\pi$  and  $V_i$  is the line-of-sight velocity for the  $i^{\text{th}}$  point in the scan. For the calculation of the three wind components it is necessary to calculate only  $a_0$ ,  $a_1$ , and  $b_1$ . However, the second and third harmonics (i.e.,  $n = 2$  and  $n = 3$ ) are also calculated as an indication of the nonuniformity of the wind. A correction factor must be applied to compensate for the absence of data points which lie below the velocity threshold. Although the line-of-sight signature in the VAD mode is theoretically sinusoidal, the existence of the velocity threshold causes the signature to appear as shown in Fig. 3-10. For the purposes of deriving the correction factor, the origin is chosen so

$$v_r = \frac{a_0}{2} + b_1 \sin \theta$$

In Fourier analysis  $a_0/2$  is the dc component.

If the vertical component of velocity is small compared with the magnitude of the velocity threshold, the angle for which the signature is zero is  $Z\pi/2$  as shown in Fig. 3-10. The parameter,  $Z$ , is the ratio of zero points to total points in the VAD scan. Let  $a_0^*$  and  $b_1^*$  be the values of the Fourier coefficients calculated from the line-of-sight velocity signature. The integral form of the equations for Fourier coefficients is used. For the theoretical velocity signature,

$$a_0^* = 1/\pi \int_0^{2\pi} (a_0/2 + b_1 \sin \theta) d\theta = a_0$$

However for the actual velocity signature

$$a_0^* = 1/\pi \left[ \int_{Z\pi/2}^{\pi-Z\pi/2} (a_0/2 + b_1 \sin \theta) d\theta + \int_{\pi+Z\pi/2}^{2\pi-Z\pi/2} (a_0/2 + b_1 \sin \tilde{\theta}) d\tilde{\theta} \right] = a_0(1-Z)$$

Therefore a correction factor of  $1/(1-Z)$  must be applied to the calculated value of  $a_0$ .

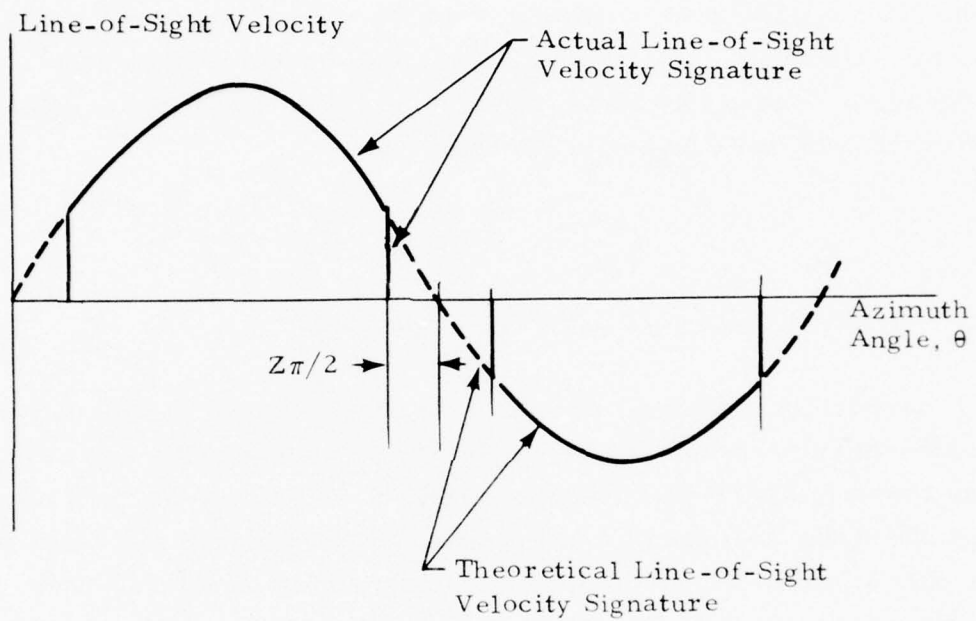


Fig. 3-10 - Line-of-Sight Velocity Signature of VAD

For the sine term, for the theoretical velocity signature

$$b_1^* = 1/\pi \int_0^{2\pi} (a_0/2 + b_1 \sin\theta) \sin\theta \, d\theta = b_1$$

For the actual velocity signature

$$\begin{aligned} b_1^* &= 1/\pi \left[ \int_{Z\pi/2}^{\pi-Z\pi/2} (a_0/2 + b_1 \sin\theta) \sin\theta \, d\theta + \int_{\pi+Z\pi/2}^{2\pi-Z\pi/2} (a_0/2 + b_1 \sin\theta) \sin\theta \, d\theta \right] \\ &= b_1 \left[ 1 - Z + \frac{\sin Z\pi}{\pi} \right] \end{aligned}$$

Therefore, a correction factor  $1/[1 - Z + (\sin 2\pi)/\pi]$  must be applied to the horizontal wind components.

The calculation procedure for the spectral algorithm is:

1. Compute the Fourier coefficients for the first three harmonics ( $n=1, 2, 3$ )

$$a_n = 2/L \sum_{i=1}^L V_i \cos(2\pi i n/L)$$

$$b_n = 2/L \sum_{i=1}^L V_i \sin(2\pi i n/L)$$

2. Compute corrected fundamental harmonic

$$\text{Corrected Value} = \frac{1}{1 - Z + (\sin 2\pi)/\pi} * \text{Calculated Fundamental}$$

3. Compute vertical wind correction

$$\text{Corrected Value} = \frac{1}{1 - Z} * \text{Calculated Value}$$

4. Compute horizontal velocity

$$V_h = \frac{\sqrt{a_1^2 + b_1^2}}{\sin\beta}$$

5. Compute horizontal angle

$$\text{Angle}_h = \text{Atan}(b_1/a_1)$$

6. Compute vertical wind velocity

$$w = \frac{-a_o}{2 \cos\beta}$$

### 3.2.3 Sine Curve Fit Technique

The line-of-sight velocity signature is sinusoidal for a uniform wind. Therefore, we find the best sinusoidal wave which fits the data in a least squares sense. Therefore we wish to minimize

$$\sum (V_i - C - A \cos\theta_i - B \sin\theta_i)^2$$

where  $V_i$  is the line-of-sight velocity (derectified) at point  $i$ ,  $\theta_i$  is azimuth at point  $i$ . Thus we obtain  $A$ ,  $B$ , and  $C$  by

$$\left[ \sum_i \cos^2\theta_i \right] A + \left[ \sum_i \cos\theta_i \sin\theta_i \right] B + \left[ \sum_i \cos\theta_i \right] C = \sum_i V_i \cos\theta_i$$

$$\left[ \sum_i \cos\theta_i \sin\theta_i \right] A + \left[ \sum_i \sin^2\theta_i \right] B + \left[ \sum_i \sin\theta_i \right] C = \sum_i V_i \sin\theta_i$$

$$\left[ \sum_i \cos\theta_i \right] A + \left[ \sum_i \sin\theta_i \right] B + nC = \sum_i V_i$$

The steps for calculating wind using the least squares algorithm are:

1. Find least squares curve fit for a sine wave to the data

$$\text{Minimum} = \sum (V_i - C - A \cos \theta_i - B \sin \theta_i)^2$$

where

$V_i$  is line-of-sight velocity at point

$\theta_i$  is azimuth at point

C, A and B are coefficients to be solved for.

2. Compute horizontal velocity

$$V_h = \frac{\sqrt{A^2 + B^2}}{\sin(\text{cone angle}/2)}$$

3. Compute horizontal angle

$$\text{Angle}_h = \text{Atan}(B/A)$$

4. Compute vertical wind velocity

$$w = \frac{-C}{\cos(\text{cone angle}/2)}$$

## Section 4

### DATA COLLECTION AND ANALYSIS

In this section the data collection procedure and interpretation of the data are described. Proper interpretation of the data is very important. The Lockheed Mobile Atmospheric Unit was built as an experimental unit for the measurement of atmospheric wind phenomena. At the time of the beginning of the fog tests at Otis AFB, the Lockheed unit had been in operation for approximately ten months. During this time period, much information about the operation of remote sensing systems was gained, and new operating techniques were generated. For example, the least squares sine algorithm was originated because of inaccuracies in the peak and spectral algorithms observed in field tests.

During the field tests, design improvements in both system hardware and software have become apparent, and many of these improvements have been incorporated into LDV systems built for the U.S. Army and the Department of Transportation. Some of these improvements are discussed in this section as an indication of the manner in which data resulting from a system designed for use in a fog dispersal system would differ from the data presented herein.

The data described herein is the first data collected in fog with the laser Doppler velocimeter. As expected, the system performed well. However, certain operational and design improvements could further enhance the quality of the data in a system designed for use in fog. The improvements are discussed in this section.

#### 4.1 TEST DESCRIPTION

The Lockheed Mobile Atmospheric Unit was operational at the Otis AFB test site from 7 September through 30 September 1976. The unit was placed on standby status, and the unit was operated for wind measurement during periods of fog. A diagram of the Otis AFB test site is shown in

Fig.4-1. For the test, the direction of the towers was assumed to be north. The positive  $u$  coordinate was taken as wind from the west, and the positive  $v$  component was taken as wind from the south. A table of the days and times on which data were taken is shown in Table 4-1. During the test runs, the altitude at which the VAD scans were made alternated between 30 m and 45 m. Thus, in each minute time period, six scans were made at 30 m and six scans were made at 45 m. Each scan requires five seconds of time.

The brief time breaks in the data are for two reasons. The first was to adjust the laser power for the adjunct purpose of obtaining data on laser attenuation in fog and was unrelated to the primary purpose of the test. The laser power fluctuates slightly with time. In the condition for which wind data only are required, laser power fluctuation is never large enough to be of concern. However, for laser attenuation studies, it was believed that the power should be kept constant.

The second reason for the short interruptions was the removal of moisture condensation from the mirrors in the scanner. In a system designed for operation in fog, a small heater in the scanner would prevent such condensation.

#### 4.2 DATA PRESENTATION

Sample data output are shown in Figs.4-2 and 4-3. A complete tabular listing of the data measured during the test is presented in Appendix B. The date is the test site date on which the run was initiated. All times are Greenwich Mean Time. The height is the indicated altitude (meters) on the laser focusing system. Before each test run, the laser ranging system is calibrated to assure that the actual altitude of the data is the desired altitude. Thus, an indicated altitude of 28 m corresponds to an actual altitude of 30 m, and an indicated altitude of 43 m corresponds to an actual altitude of 45 m. The data were reduced to give five minute averages beginning at even five minute time periods. Although the run of 16 September started at 09:15:30, the first even five minute time period began at 09:20:00. The following interpretations are placed on each of the columns.

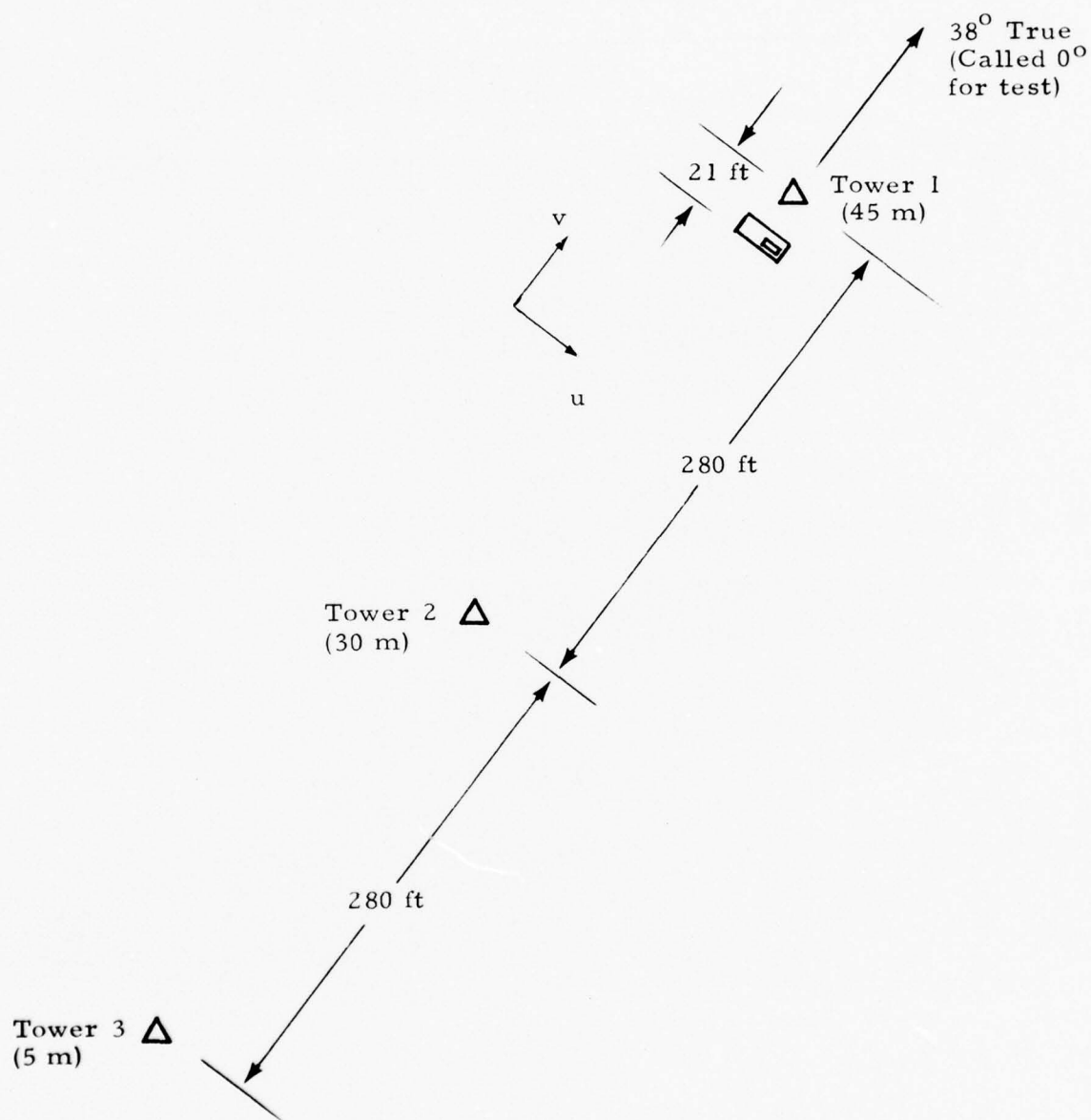


Fig.4-1 - Diagram of Otis AFB Test Site

Table 4-1  
DATA COLLECTION AT OTIS AFB

Date	Start	Stop	Threshold Velocity (m/sec)	Approx. Wind Speed (m/sec)	Approx. Wind Direction	Fog Type
9-16-76	9:15:30	10:00:00	0.53	2	140 <sup>o</sup>	Radiation
	10:03:15	10:30:00	0.53	1.5	200 <sup>o</sup>	
	10:31:00	11:00:00	0.53	1.5	200 <sup>o</sup>	
	11:27:20	11:36:45	0.53	1.5	200 <sup>o</sup>	
	11:41:20	12:00:05	0.53	2	240 <sup>o</sup>	
	12:07:00	12:12:00	0.53			
9-18-76	3:16:20	6:08:40	0.79	3-5	150 <sup>o</sup>	Advection
	6:16:00	6:51:00	0.79	5	160 <sup>o</sup>	
9-18-76	7:16:00	8:12:00	1.06	7	180 <sup>o</sup>	
9-28-76	00:25:00	00:39:00	1.06			
	00:44:00	03:00:00	1.06			
9-28-76	3:15:17	3:25:47	2.12			
	3:30:00	3:34:45	2.12			
	3:39:00	4:41:00	2.12			

VAD OTIS TIME IN GMT VAD 9/16/76 OTIS AIRFORCE HU270.

START TIME 9:20: 0  
END TIME 9:25: 0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	W	SPEED	T <sub>W</sub>	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	156	-173	45	234	130.1	144	-151	22	209	136.6	16	11	152	-182	-22	238	140.3	9	
2	161	-170	52	236	136.7	137	-132	17	198	133.6	28	19	153	-158	-14	230	135.6	20	
3	148	-182	49	439	141.2	167	-124	16	210	126.3	25	16	173	-153	-15	236	131.9	19	
4	160	-172	53	236	137.4	151	-109	19	191	125.3	31	23	173	-160	-13	230	128.4	22	
5	142	-163	50	233	142.4	138	-134	18	198	134.1	28	17	150	-166	-15	228	137.8	17	

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT								
MIN	I		A		V <sub>TH</sub>	U		V	W		TH	20		30	U		V	W		TH	SP
	U	V	A	SPEED		U	√TH		SPEED	U		W	SPEED		U	W		SPEED	U		
1	156	-173	45	234	136.1	144	-153	22	219	136.6	16	11	152	-182	-22	236	140.3	9			
2	158	-171	48	235	137.4	140	-141	20	203	135.1	22	15	152	-170	-18	234	137.9	14			
3	155	-174	49	236	138.5	148	-136	19	205	132.5	23	16	159	-166	-17	234	136.2	16			
4	156	-174	50	236	138.2	149	-129	19	202	130.6	25	17	162	-159	-16	233	134.1	17			
5	153	-176	50	236	139.1	147	-130	19	201	131.4	25	17	160	-161	-16	232	134.9	17			

## ONE MINUTE STANDARD DEVIATIONS

Run	PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	N	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH			
1	12	11	4	4	3.9	22	13	10	22	3.7	3	3	1	1	0.9			
2	19	20	4	3	6.7	38	47	16	18	17.6	45	57	11	12	18.6			
3	44	24	4	7	12.0	8	33	16	18	7.7	16	32	8	12	8.0			
4	11	12	5	4	3.6	15	43	19	13	13.0	27	55	12	14	14.9			
5	10	15	5	5	5.3	32	35	15	12	13.7	31	35	9	8	11.8			

## CUMULATIVE STANDARD DEVIATIONS

Run	Pulse			I, FOURIER COEFFICIENTS				SINE WAVE FIT					
	U	V	$\theta$	TH	U	V	W	SPEED	TH	U	V	$\theta$	TH
1	12	11	4	3.9	22	13	10	22	3.7	3	1	1	1.9
2	15	5	4	5.3	35	34	13	20	12.3	30	9	9	12.8
3	20	13	5	7.2	26	34	13	19	11.7	28	8	10	11.7
4	23	16	5	6.0	25	37	14	18	12.2	20	9	11	12.7
5	22	16	5	5.0	28	35	14	17	12.3	26	9	10	12.4

Fig. 4-2 - Sample Data Output at 96 ft Altitude

START TIME 9:20: 0  
END TIME 9:25: 0

HD270.

OTIS AIRFORCE

VAD 9/16/76

VAD	OTIS2	TIME IN GMT
1	1	1200
2	2	1200
3	3	1200
4	4	1200
5	5	1200
6	6	1200
7	7	1200
8	8	1200
9	9	1200
10	10	1200
11	11	1200
12	12	1200
13	13	1200
14	14	1200
15	15	1200
16	16	1200
17	17	1200
18	18	1200
19	19	1200
20	20	1200
21	21	1200
22	22	1200
23	23	1200
24	24	1200
25	25	1200
26	26	1200
27	27	1200
28	28	1200
29	29	1200
30	30	1200
31	31	1200
32	32	1200
33	33	1200
34	34	1200
35	35	1200
36	36	1200
37	37	1200
38	38	1200
39	39	1200
40	40	1200
41	41	1200
42	42	1200
43	43	1200
44	44	1200
45	45	1200
46	46	1200
47	47	1200
48	48	1200
49	49	1200
50	50	1200
51	51	1200
52	52	1200
53	53	1200
54	54	1200
55	55	1200
56	56	1200
57	57	1200
58	58	1200
59	59	1200
60	60	1200
61	61	1200
62	62	1200
63	63	1200
64	64	1200
65	65	1200
66	66	1200
67	67	1200
68	68	1200
69	69	1200
70	70	1200
71	71	1200
72	72	1200
73	73	1200
74	74	1200
75	75	1200
76	76	1200
77	77	1200
78	78	1200
79	79	1200
80	80	1200
81	81	1200
82	82	1200
83	83	1200
84	84	1200
85	85	1200
86	86	1200
87	87	1200
88	88	1200
89	89	1200
90	90	1200
91	91	1200
92	92	1200
93	93	1200
94	94	1200
95	95	1200
96	96	1200
97	97	1200
98	98	1200
99	99	1200
100	100	1200

VAD OTIS2

HEIGHT = 43.

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH		
1	192	-177	46	462	132.6	-161	24	228	135.2	15	14	178	-194	-22	264	137.6	8	
2	195	-180	46	466	132.9	-161	26	245	135.3	13	9	181	-197	-22	269	137.6	8	
3	200	-174	46	464	132.0	-172	28	248	135.4	11	9	181	-204	-22	273	138.6	9	
4	196	-179	45	461	131.5	-174	30	235	138.1	13	10	167	-206	-23	266	141.1	7	
5	169	-176	52	245	136.4	-174	23	222	142.5	16	6	151	-194	-21	247	142.5	10	

## CUMULATIVE MEANS

Run	Peaks			I			Fourier Coefficients			I			Sine Wave Fit			TH	SP
	U	V	W	Speed	TH	U	V	W	Speed	TH	20	30	U	V	W		
1	192	-177	48	262	132.6	160	-161	24	228	135.2	15	14	178	-194	-22	264	137.6
2	193	-178	47	264	132.8	169	-164	25	237	134.7	14	12	180	-196	-22	267	137.6
3	195	-179	46	265	132.6	170	-164	26	240	134.7	13	11	180	-198	-22	268	137.9
4	188	-184	46	264	134.7	167	-169	27	239	135.6	13	11	176	-200	-22	268	136.8
5	184	-183	47	260	135.0	160	-170	26	235	135.0	14	10	171	-199	-22	264	135.5

ONE MINUTE STANDARD DEVIATIONS

RUN	PEAKS			FOURIER COEFFICIENTS			SINE WAVE FIT						
	U	V	W	TH	U	V	W	TH	U	V	W	TH	
1	4	5	2	1.4	15	22	11	25	2.2	2	1	2	0.6
2	5	7	3	1.9	8	17	7	7	4.3	5	1	3	1.1
3	6	11	2	2.7	10	12	4	6	3.4	4	1	2	1.1
4	11	13	4	3.3	5	12	3	3	2.5	5	4	1	0.9
5	7	6	4	2.0	27	3	7	13	6.3	19	6	4	4.5

### CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS			I SINE WAVE FIT			TH			
	U	V	W	U	V	W	U	V	W				
1	4	5	2	14	15	22	11	25	2	2	1	2	0.6
2	5	6	3	16	19	19	20	20	3	4	1	3	0.9
3	6	7	4	17	13	12	17	17	3	5	1	4	1.0
4	7	8	5	18	14	11	17	16	4	6	2	5	1.7
5	10	13	3	12	15	17	7	16	7	6	2	10	2.0
6	12	14	4	9	21	15	7	16	15	6	2	10	2.7
7	14	16	5	3	21	15	7	16	15	6	2	10	2.9

Fig. 4-3 - Sample Data Output at 156 ft Altitude

#### 4.2.1 One Minute Means

One minute means were calculated for each of the minutes of the five minute time period. The minutes of the time period are tabulated in the first column. Each of the numbers in this group is an average of the six VAD scans that occur at the given altitude during one minute.

##### Peaks

The one minute mean  $u$ ,  $v$  and  $w^*$  components of wind as calculated by the peak algorithm are tabulated. The  $w$  component is the vertical component and is positive vertically upward. Speeds are given in cm/sec and angles are given in degrees.

The data calculated from the basic VAD data are horizontal wind speed, wind direction, and vertical component of wind velocity. The  $u$  and  $v$  components are calculated from horizontal wind speed and direction. The speed is the one minute average of the horizontal component of velocity, and "TH" is  $\theta_o$ , the direction of the horizontal component of wind. The  $u$  and  $v$  averages are calculated by averaging the  $u$  and  $v$  values of the individual VAD scans rather than from averaged values of  $u$  and  $v$ . Thus

$$u_i = -S_i \sin \theta_{o,i}$$

and

$$v_i = -S_i \cos \theta_{o,i}$$

where the  $i$  subscript refers to the individual VAD scans. The average for  $n$  scans in the one minute average is

$$\bar{S} = \sum S_i / n$$

---

\* Because of a processing error (since corrected) the  $w$  component should be multiplied by  $-0.5$ .

$$\bar{\theta}_o = \sum \theta_{o,i}/n$$

$$\bar{u} = \sum u_i/n$$

and

$$\bar{v} = \sum v_i/n$$

It is noted in general that

$$\bar{u} \neq -\bar{S} \sin \bar{\theta}_o$$

$$\bar{v} \neq -\bar{S} \cos \bar{\theta}_o$$

and

$$\bar{S} \neq \sqrt{\bar{u}^2 + \bar{v}^2}$$

The same averaging characteristic results from resolving cup and vane anemometer data into components and averaging or when comparing averaged data from cup and vane anemometers with averaged data from propeller anemometers. The characteristic is particularly pronounced in light and variable wind conditions.

#### Fourier Coefficients\*

Results are shown for wind calculations performed using the spectral algorithm. The symbols have the same meaning as for the peaks algorithm. The "2D" is the magnitude of the second harmonic and is the average of  $\sqrt{a_2^2 + b_2^2}$  where  $a_2$  is the second Fourier cosine coefficient and  $b_2$  is the second Fourier sine coefficient. Similarly, "3D" is the average of  $\sqrt{a_3^2 + b_3^2}$ . The magnitude of these numbers is an indication of turbulence with the frequency of the turbulence increasing with the number of the harmonic.

#### Sine Wave Fit

Results are shown for the least squares sine fit algorithm with similar meanings of the symbols as for the other two algorithms. The "SP" is an indication of the deviation of the data points from a perfect sine fit.

---

\* Because of a processing error (since corrected) the w component should be multiplied by -1.

#### 4.2.2 Cumulative Means

The cumulative means are averages of individual VAD scans taken over the time period indicated. For example, the three minute cumulative mean is the average of the VAD scans taken over the first three minutes of the five minute time period. They are not averages of the one minute means. The two averaging methods would be identical if the number of VAD scans in each one minute average were always identical. The five minute cumulative means are the averages over the five minute time period of interest.

#### 4.2.3 One Minute Standard Deviations

This section lists the standard deviation of each of the variables for each one minute time period. Each standard deviation is the standard deviation of the six VAD scans in the one minute period.

#### 4.2.4 Cumulative Standard Deviations

The cumulative standard deviations are analogous to the standard means. They are the standard deviations of the individual VAD scans taken over the time period indicated. In general, the cumulative averages of the standard deviations are not averages of the one minute means because of the mathematical definition of standard deviation.

### 4.3 DATA ANALYSIS

Although meteorological tower data are not available for direct comparison with laser measured winds, a discussion of previous wind comparisons with meteorological towers is helpful in the interpretation of the results of this test. Observations about operation in fog are also appropriate.

#### 4.3.1 Comparison of Computational Algorithms

The relative accuracies of the three computational algorithms can be seen by comparison with meteorological data in past tests.

The winds calculated with the three algorithms described in Section 3 are shown in Figs. 4-4 through 4-6 for data measured at the Wave Propagation Laboratory, National Oceanic and Atmospheric Administration, Boulder, Colorado. The winds were measured in March 1976. The sole difference between the three parts of each figure is the data processing algorithm used. Some general observations are that the peak algorithm tends to give mean wind values that are biased slightly high compared to the tower measured mean winds. This is primarily due to temporal variations in the wind at higher frequencies than the fundamental frequency in the VAD signature; thus the peak of the signature (i.e., the fundamental frequency with superimposed higher frequency variations) has a value that is higher than the averaged values. This interpretation is confirmed by the runs for which the greatest deviation above the 45 degree line occur are the runs for which the greatest value of wind standard deviation (measured by the tower) occur. In particular, for the points of Run 9 farthest off the 45 degree line in Figs. 4-5 and 4-6, the standard deviation of wind speed is 1.82 m/sec and 1.75 m/sec, respectively, whereas the standard deviation of wind speed was usually between 0.9 m/sec and 1.4 m/sec.

It is also observed that the spectral algorithm tends to give mean wind values that are biased slightly low compared to the tower measured mean winds. It was observed during the data processing of the Boulder data that the magnitude of the bias is a function of the number of valid line-of-sight velocities obtained during the VAD scan. The bias is insignificant for data where more than 50 valid data points are obtained during each VAD scan. It is noted that a number of data points below this value was obtained only rarely at Table Mountain and that the low number of data points would never occur in air with a larger quantity of natural aerosol than the very clean air of Table Mountain. The least squares sine algorithm seems to present no systematic bias, and the scatter of the data about the 45 degree line is less for the sine algorithm than for the other two processing techniques. A comparison of the peak algorithm and the spectral algorithm with the sine algorithm for the data measured at Otis AFB is shown in Fig. 4-7. In similar figures in the

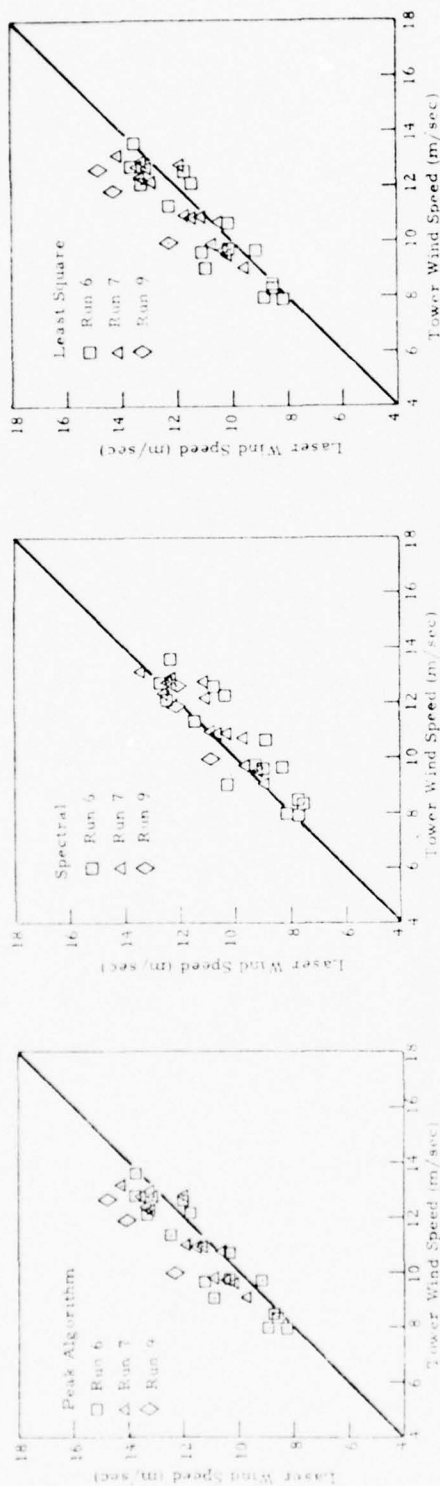


Fig. 4-4 - Comparison of Laser and Tower 16 min Mean Wind Speed at 30 m Altitude

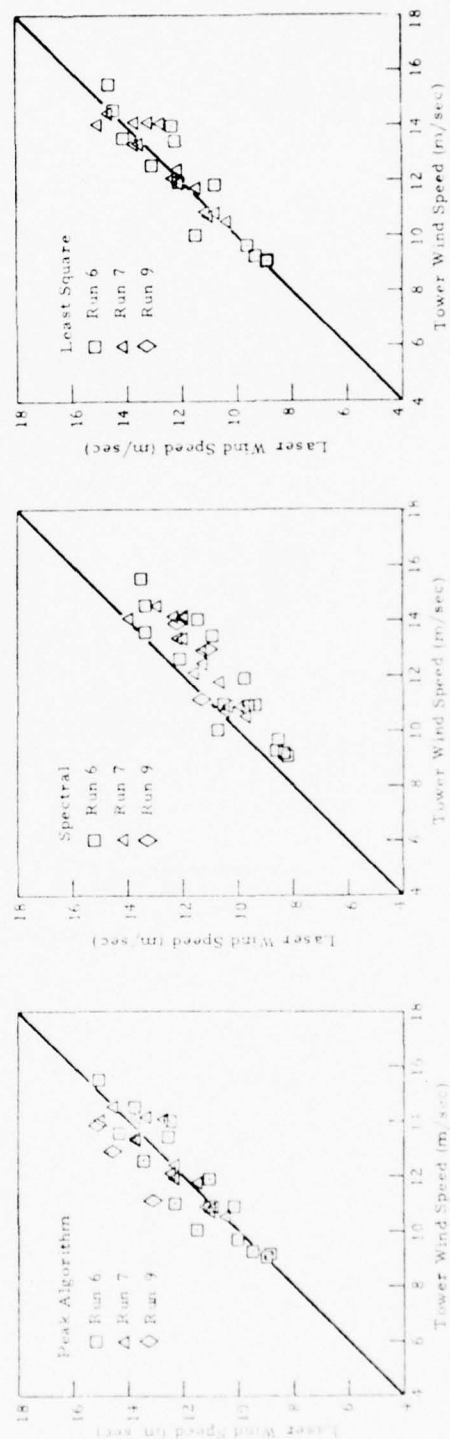


Fig. 4-5 - Comparison of Laser and Tower 16 min Mean Wind Speed at 60 m Altitude

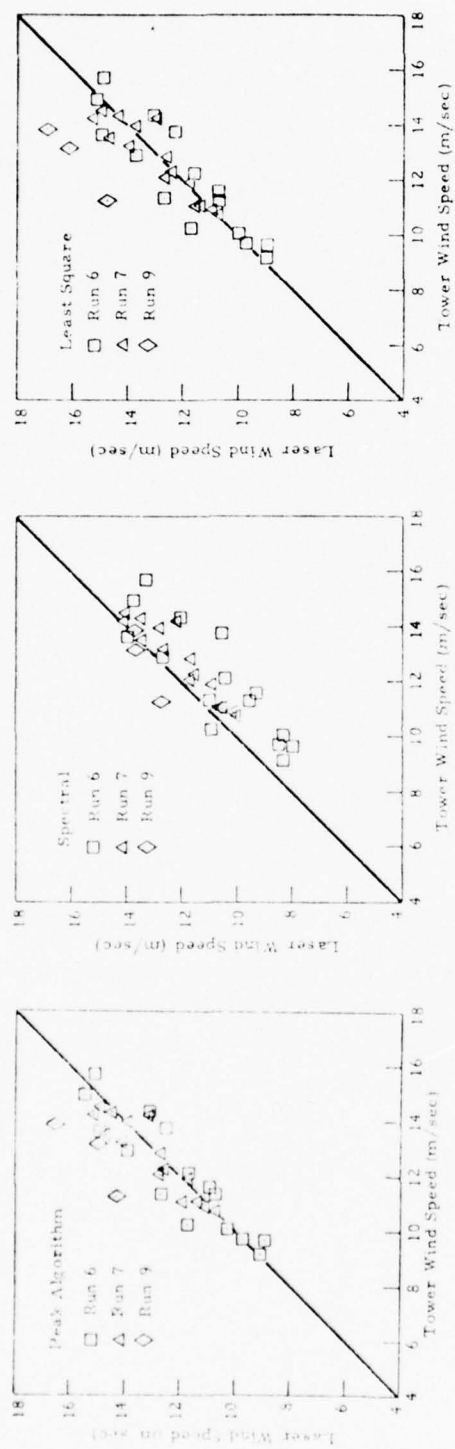


Fig. 4-6 - Comparison of Laser and Tower 16 min Mean Wind Speed at 90 m Altitude

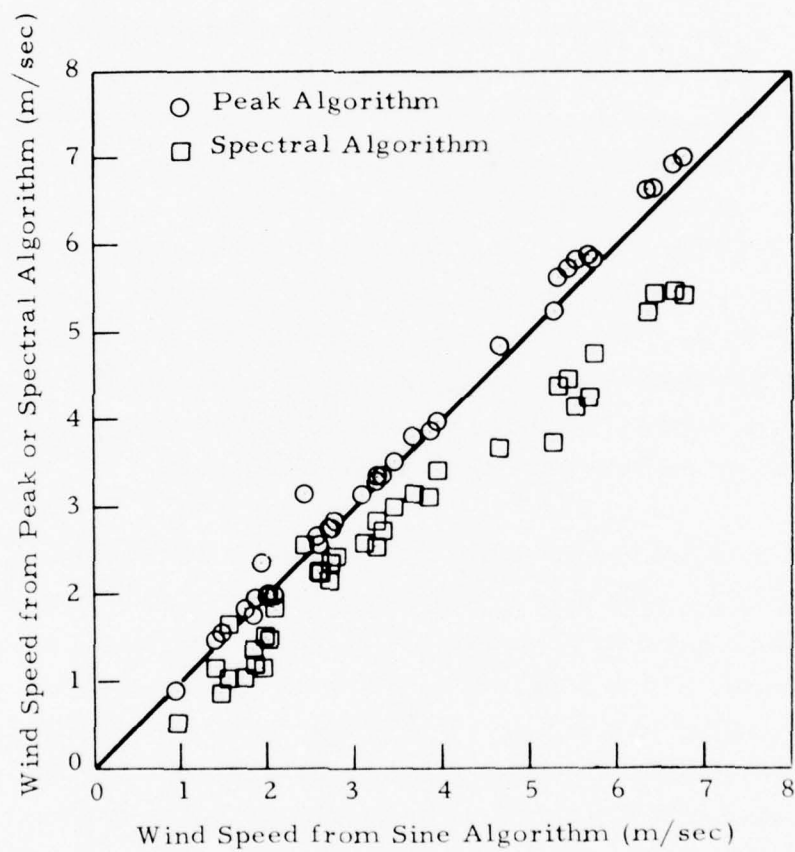


Fig. 4-7 - Comparison of Data Processing Algorithms Measured at Otis AFB

Boulder data (Figs. 4-8 and 4-9) it was observed that the speed calculated by the peak algorithm was almost always greater than that calculated by the sine algorithm. The same observation is valid for the data greater than 4 m/sec at Otis AFB, but for light winds ( $< 2$  m/sec) the peak algorithm often gives a value which is less than that derived from the sine algorithm.

#### 4.3.2 Variations in Fog Density

One of the problems associated with wind measurement in fog is measurement in both fog and clear air. Unfortunately, the magnitude of this problem was not completely anticipated and some data were lost. In fog, for the manner in which the data were taken, the backscattered signal is very large and must be attenuated to avoid going off scale in the spectrum analyzer. With this quantity of attenuation, when the focal volume hits clear air, an adequate signal cannot be obtained. This problem occurs if the data are taken on a linear scale. The Lockheed system also has a logarithmic scale which avoids the problem by displaying and recording the logarithm of the intensity of the return signal. Since the magnitude of the problem was not anticipated, all data during the test were taken in the linear mode.

The problem is illustrated by the data for 18 September. From the magnitude of the wind it is apparent that the fog is an advection fog. Valid data for wind speed on the order of 3 m/sec to 4 m/sec is obtained at both altitudes from 3:20 to 5:20. However, after 5:20 the wind increased to an order of 5 m/sec to 6 m/sec. This would cause the advection fog to lift slightly, providing clearer air at the lower altitude. The data taken at 30 m altitude between 5:20 and 6:50 is therefore somewhat sparse. During the brief interruption from 6:51 to 7:16 the laser power and signal attenuation were adjusted, and valid data were obtained thereafter.

A similar condition is seen in the data of 16 September. The wind speed indicates a radiation fog. Valid data are obtained at the beginning of the run. As the depth of the fog decreased after sunrise, the system began to lose data at the higher altitude. Adjustment of laser power and attenuation at 11:40 restored a good signal at both altitudes.

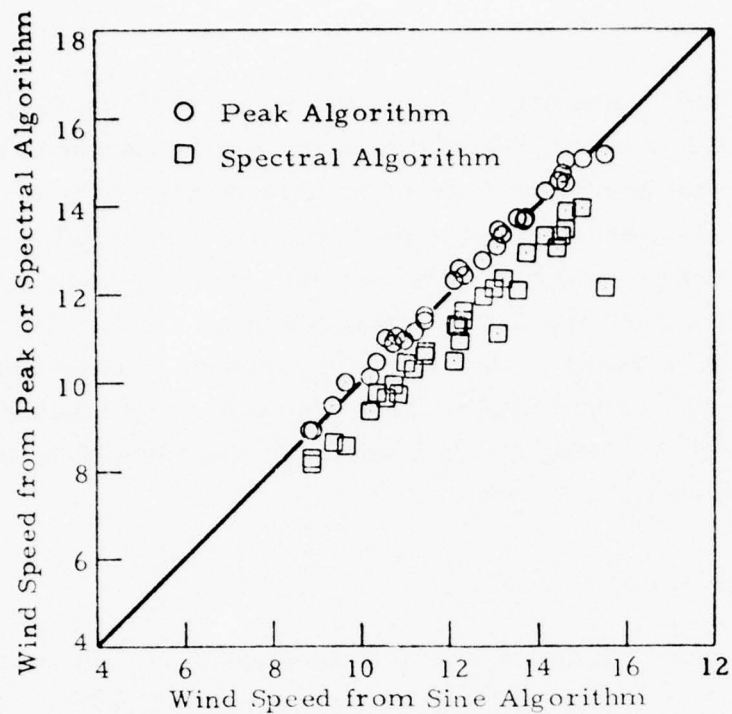


Fig.4-8 - Comparison of Data Processing Algorithms at 60 m Altitude Measured at Table Mountain, Colorado

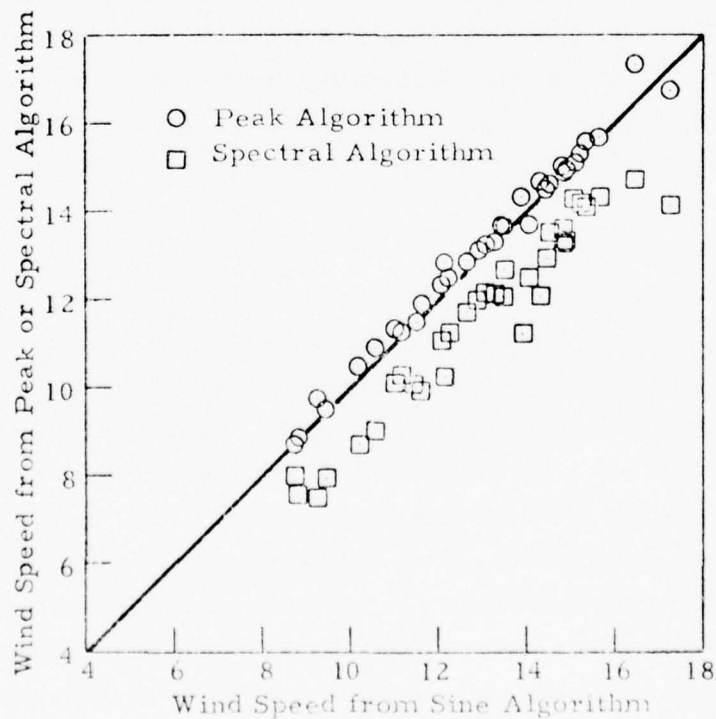


Fig.4-9 - Comparison of Data Processing Algorithms at 150 m Altitude Measured at Table Mountain, Colorado

As mentioned previously, these adjustments would have been unnecessary if the laser intensity had been measured in the logarithmic scale. In order to verify that an adequate signal could be obtained both in and out of fog conditions, Lockheed-Huntsville made measurements in low cloud conditions at its Huntsville facility on 7 December 1976. The reported meteorological conditions at the Huntsville-Madison County Jetplex (10 miles from the test site) are shown in Table 4-2, and wind conditions are shown in Figs. 4-10 through 4-17. More complete data from this set of measurements are shown in Appendix C. Adequate data were obtained for both in and out of the clouds using the logarithmic scale.

#### 4.3.3 Light and Variable Winds

The existence of light and variable winds presents some unique conditions which must be considered in the data analysis. The first of these is important when comparing the LDV data with propeller anemometer data. For the propeller anemometer data, the wind can fall below the threshold value in one of the component directions. However, because the LDV operates in speed-direction coordinates and then transforms the data into orthogonal coordinates, it has no threshold value in the orthogonal directions. Thus the LDV can indicate values of wind which are below the threshold value of the anemometers. This can affect the averaging over a period of time.

In the mode of LDV operation without a frequency translator, the system is unable to distinguish between positive and negative velocities. Therefore, at the beginning of each run, the operator makes an estimate of wind direction, and the direction is chosen as the angle of the peak of the VAD scan (cf. Figs. 3-7 and 3-8) which lies closest to the estimated wind direction. In practice this causes no problem if the actual wind direction is within  $\pm 89$  deg of the estimated wind. In all previous applications of the VAD technique, this criterion has been easily met, and no ambiguity has resulted from the system limitation. However, in light and variable winds, the variation in wind direction from the estimated wind direction can occasionally exceed 90 deg for one or more scans in the one minute average. For each scan for which

HEIGHT = 30. VAD HREC2 VAD 12/07/76 MUNTSSVILLE ALA. HD270. START TIME 9:45:19 END TIME 9:50:19

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	SP	I	3D	2D	SP
1	-523	713	63	594	324.1	-634	515	43	819	309.2	8	9	899
2	-515	620	252	806	320.2	-469	428	76	635	312.3	26	18	779
3	-475	642	140	816	322.7	-198	563	-2	623	338.4	35	31	818
4	-493	692	112	850	324.5	-558	563	42	793	315.2	5	6	832
5	-511	676	176	844	322.8	-492	509	87	709	316.0	23	17	876

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	SP	I	3D	2D	SP
1	-523	713	63	594	324.1	-634	515	43	819	309.2	8	9	899
2	-520	682	126	864	322.8	-579	486	54	757	310.2	14	12	859
3	-502	666	132	845	322.8	-426	517	31	704	321.5	23	20	843
4	-500	670	128	846	323.0	-448	524	33	719	320.5	20	17	841
5	-503	672	140	847	323.0	-459	521	46	716	319.3	21	17	850

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	SP	I	3D	2D	SP
1	177	51	19	64	11.2	82	7	8	59	4.0	47	27	53
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	141	203	22	77	16.6	196	190	4	109	23.5	289	161	44
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	17	50	64	30	3.0	65	55	15	84	0.7	11	10	15

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	SP	I	3D	2D	SP
1	177	51	19	64	11.2	82	7	8	59	4.0	47	27	53
2	126	65	110	68	8.2	112	50	20	114	3.4	41	82	79
3	116	113	179	67	10.1	244	110	34	122	19.6	252	139	64
4	104	102	71	60	9.1	224	100	31	115	17.7	227	125	57
5	88	88	68	52	7.8	192	87	37	103	15.1	192	109	51

Fig. 4-10 - Wind Data Measured at 30m Altitude with Low Clouds

HEIGHT = 45. VAD HRECZ VAD 12/07/76 HUNTSVILLE ALA. H0270. START TIME 9:45:19 END TIME 9:50:19

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS								I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	SP	
1	-440	837	80	947	332.2	-465	660	20	808	324.7	22	18	-536	811	-59	973	326.5	44	
2	-458	822	97	942	330.8	-478	660	86	816	324.1	7	8	-458	806	-73	927	330.3	46	
3	-563	686	132	905	320.3	-22	260	3	659	6.9	41	39	8	392	-41	867	12.0	136	
4	-581	415	138	715	305.5	-87	689	84	695	352.7	16	31	-64	730	-80	732	354.9	124	
5	-514	715	183	889	323.8	-515	641	77	823	321.4	2	4	-516	700	-73	871	323.6	55	

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS								SINE WAVE FIT								
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	2D	3D	I	U	V	W	SPEED	TH	SP
1	-440	837	80	947	332.2	-465	660	20	808	324.7	22	18	18	-536	811	-59	973	326.5	44	
2	-446	832	85	945	331.7	-469	660	42	810	324.5	17	15	15	-510	809	-64	958	327.8	45	
3	-493	773	104	929	327.1	-272	500	27	750	341.5	27	24	24	-302	642	-55	921	345.5	81	
4	-508	714	110	893	323.5	-242	531	36	741	343.3	25	26	26	-263	657	-59	890	347.0	88	
5	-509	714	128	892	323.6	-310	559	46	761	337.8	19	20	20	-326	668	-62	885	341.2	80	

ONE MINUTE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	
1	45	35	67	10	3.4	76	126	36	147	.7	61	2	6	35	3.0		
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3	167	182	42	33	15.6	850	109	38	15	94.4	1063	277	16	115	90.0		
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5	89	159	69	76	10.7	98	60	5	108	2.7	71	39	3	74	2.3		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH
1	45	35	67	10	3.4	76	126	36	147	.7	61	2	6	35			3.0
2	33	26	48	8	2.5	54	89	45	104	.6	63	3	9	37			3.0
3	108	123	47	28	10.2	505	235	43	111	52.6	605	267	16	80			51.1
4	103	183	45	91	12.7	458	224	45	102	47.3	550	242	18	105			45.9
5	94	166	57	62	11.5	409	197	42	103	41.2	480	206	17	94			40.3

Fig. 4-11 - Wind Data Measured at 45m Altitude with Low Clouds

START TIME 9:45:19  
END TIME 9:50:19

HD270.

WAD 12/07/76

WAD WRECZ

HEIGHT = 60.

## ONE MINUTE MEANS

MIN			PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH
1	-645	686	78	967	316.1	-500	656	27	835	321.7	19	18	-598	776	-59	987	322.6
2	-545	790	101	960	325.3	-523	759	76	922	325.4	6	6	-480	834	-51	962	330.0
3	-740	495	84	894	303.9	-550	361	-33	664	303.5	32	3	-746	539	-37	922	305.9
4	-287	818	120	866	340.6	-326	590	82	675	331.0	19	27	-457	754	-30	882	328.7
5	-348	666	215	826	328.9	-332	674	115	752	333.6	24	30	-400	785	-61	882	333.2

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT									
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-645	686	78	967	316.1	-500	656	27	835	321.7	19	18	-598	776	-59	987	322.6
2	-625	721	86	965	319.2	-507	690	43	864	325.0	15	14	-559	795	-56	979	325.1
3	-617	630	85	936	313.1	-525	559	12	784	318.2	22	21	-633	693	-48	956	317.4
4	-617	661	91	925	317.7	-491	564	7	766	317.8	21	22	-604	703	-45	944	319.3
5	-577	663	122	900	320.5	-452	592	47	763	321.8	22	24	-553	724	-54	929	322.8

### ONE MINUTE STANDARD DEVIATIONS

PEAKS					I, FOURIER COEFFICIENTS					I SINE WAVE FIT					TH
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	171	113	54	38	12.0	67	204	57	120	12.3	163	57	4	54	9.5
2	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0
3	105	47	54	61	6.2	69	85	28	10.3	51	36	25	20	3.7	.0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0
5	342	314	15	101	32.4	5	47	18	40	1.9	98	36	56	76	4.6

## CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS				I, SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	171	113	54	38	12.0	67	204	57	120	12.3	163	57	4	54	9.5
2	140	100	40	27	10.0	49	156	49	99	9.0	134	52	5	41	8.0
3	128	145	39	53	11.4	61	214	56	130	13.5	142	146	17	44	12.1
4	194	150	38	55	15.2	98	193	58	125	13.7	146	133	17	49	11.7
5	237	174	66	76	18.5	111	172	65	107	13.7	160	119	31	58	12.0

Fig. 4-12 - Wind Data Measured at 60m Altitude with Low Clouds

HEIGHT = 90. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. HD270. START TIME 9:45:19 END TIME 9:50:19

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS								I SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-680	619	100	921	312.3	-435	463	-67	637	316.7	34	22	-523	833	-54	984	327.8	55	
2	-566	725	93	944	321.5	-464	564	35	736	319.9	28	26	-556	776	-37	967	324.1	59	
3	-492	783	134	925	327.8	-357	604	-31	702	329.4	28	29	-534	760	-36	929	324.8	48	
4	-561	734	49	929	322.8	-386	520	0	653	322.7	27	23	-452	792	-20	915	330.1	57	
5	-353	876	133	944	338.0	-374	510	-49	633	323.7	25	26	-457	732	-28	863	328.0	55	

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS								I SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-680	619	100	921	312.3	-435	463	-67	637	316.7	34	22	-523	833	-54	984	327.8	55	
2	-604	690	95	936	318.4	-454	531	1	703	318.8	30	25	-545	795	-42	972	325.3	58	
3	-576	713	105	934	320.8	-430	549	-6	703	321.5	29	26	-542	786	-41	962	325.2	55	
4	-571	720	86	932	321.4	-415	539	-4	686	321.9	29	25	-512	788	-34	946	326.9	56	
5	-540	742	93	934	323.8	-410	535	-10	679	322.1	28	25	-504	780	-33	934	327.0	56	

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0		
2	202	223	45	50	18.2	34	150	70	93	9.6	149	155	9	38	12.6		
3	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0		
4	141	49	24	46	8.8	36	134	110	85	9.7	74	84	11	36	6.6		
5	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0		
2	157	169	32	38	13.9	29	121	78	88	7.0	107	114	12	29	9.2		
3	140	146	32	31	12.3	54	105	66	71	7.8	88	95	10	32	7.5		
4	126	116	40	32	10.4	50	102	71	72	7.4	89	83	14	38	7.0		
5	141	121	40	30	11.3	49	94	67	69	6.8	84	78	13	47	6.4		

Fig. 4-13 - Wind Data Measured at 90m Altitude with Low Clouds

HEIGHT = 180.  
 VAD HRECZ  
 VAD 12/07/76 HUNTSVILLE ALA. HD270.  
 START TIME 9:45:19  
 END TIME 9:50:19

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	-683	737	110	1005	317.1	-604	763	63	974	321.6	7	3	-575	817	-51 1000 324.8 37
2	-572	762	103	997	322.9	-495	548	48	780	317.3	29	26	-632	750	-49 1013 319.5 36
3	-529	778	92	941	325.7	-454	791	46	913	330.1	8	4	-438	843	-34 950 332.5 52
4	-437	803	131	917	331.3	-412	584	19	724	325.2	22	22	-458	773	-42 902 329.2 50
5	-472	840	79	964	330.6	-539	705	63	888	322.6	5	11	-521	759	-47 922 325.5 53

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	-683	737	110	1005	317.1	-604	763	63	974	321.6	7	3	-575	817	-51 1000 324.8 37
2	-609	753	106	1000	321.0	-532	620	53	845	318.7	22	18	-613	772	-50 1008 321.3 37
3	-589	759	102	985	322.2	-512	663	51	862	321.6	18	15	-569	790	-46 994 324.1 41
4	-538	774	112	962	325.2	-479	636	41	816	322.8	19	17	-532	784	-45 963 325.8 44
5	-529	783	107	963	326.0	-487	646	44	826	322.8	17	16	-531	781	-45 957 325.8 45

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	327	255	33	6	24.2	239	257	77	29	26.2	253	251	29	28	20.3
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	55	56	22	23	4.7	163	46	74	56	12.8	72	68	3	21	6.2
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	240	181	24	6	17.4	180	220	55	114	18.7	182	182	20	21	14.7
3	200	148	20	30	14.4	152	199	45	99	16.3	172	153	18	34	13.2
4	175	120	24	43	12.3	148	161	51	108	14.0	149	122	14	55	10.9
5	162	112	25	40	11.4	137	149	47	102	12.7	136	112	13	53	10.0

Fig. 4-14 - Wind Data Measured at 180 m Altitude with Low Clouds

START TIME 9:45:19  
END TIME 9:50:19

CUMULATIVE MEANS

ONE MINUTE STANDARD DEVIATIONSCUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS						I			SINE WAVE FIT		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	78	47	35	33	7.1	214	120	54	102	14.7	138	139	23	36	11.2
3	73	83	33	27	6.4	545	270	54	157	54.2	724	343	27	57	58.1
4	63	74	34	26	5.6	479	271	48	155	47.6	638	319	24	53	51.2
5	76	80	31	26	6.4	431	244	46	139	43.2	581	298	23	55	46.5

Fig. 4-15 - Wind Data Measured at 270 m Altitude with Low Clouds

START TIME 9:45:19  
END TIME 9:50:19

HD270.

HUNTSVILLE ALA.

VAD 12/07/76

VAD HREC2

HEIGHT = 360.

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	SP						
1	-506	763	127	916	326.4	-371	651	108	749	330.2	27	26	-500	799	-49	943	327.9	36
2	-430	848	78	996	334.1	-463	699	40	866	326.6	21	18	-533	816	-28	988	326.6	64
3	-600	666	-7	897	317.9	-534	337	-81	633	302.2	31	28	-716	508	19	879	305.3	52
4	-573	699	16	933	320.0	-483	613	20	801	322.2	21	27	-542	739	12	944	322.8	87
5	-293	914	115	960	342.2	-264	775	92	819	341.1	19	24	-407	910	-38	997	335.9	46

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	I	3D	U	V	W	SPEED	TH	SP
1	-506	763	127	916	326.4	-371	26	-500	799	-49	943	327.9	36
2	-455	846	94	969	331.5	-432	27	-522	811	-35	973	327.0	55
3	-492	801	69	951	328.1	-458	25	-571	735	-21	949	321.6	54
4	-519	767	51	945	325.4	-466	24	-561	736	-10	947	322.0	65
5	-486	788	60	947	327.8	-437	23	-539	761	-14	955	324.0	62

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT								
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	SP				
1	0	0	0	0	0	0	0	0	0	0	0	0				
2	173	83	5	1	11.1	260	153	96	16	20.2	163	148	35	34	12.7	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	216	453	90	57	20.4	222	127	104	36	18.3	201	258	50	86	19.4	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	I	3D	U	V	W	SPEED	TH	SP				
1	0	0	0	0	0	0	0	0	0	0	0	0	0				
2	130	93	29	46	9.0	191	112	78	68	14.4	117	105	28	35	9.0	0	0
3	128	118	56	52	10.0	164	195	96	112	17.4	136	174	36	55	13.1	0	0
4	145	155	65	49	12.7	162	162	88	89	15.8	139	177	40	58	13.4	0	0
5	157	152	64	45	13.2	166	162	84	82	16.2	140	175	38	56	13.3	0	0

Fig. 4-16 - Wind Data Measured at 360m Altitude with Low Clouds

HEIGHT = 540.  
 VAD HREC2  
 VAD 12/07/76 HUNTSVILLE ALA. HD270.  
 START TIME 9:45:19  
 END TIME 9:50:19

ONE MINUTE MEANS																		
PEAKS				FOURIER COEFFICIENTS							SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-418	792	63	902	332.4	-278	753	43	806	339.5	20	16	-389	833	-34	924	335.0	47
2	-514	869	63	1010	329.4	-587	779	1	976	323.0	14	9	-531	897	-36	1043	329.3	31
3	-401	861	74	955	334.8	-429	723	79	842	329.3	13	12	-432	855	-42	960	333.0	44
4	-360	913	101	982	338.4	-386	876	37	958	336.1	3	3	-378	897	-37	974	337.1	39
5	-455	826	89	949	331.1	-360	669	91	780	331.3	24	22	-458	836	-33	961	331.3	52

CUMULATIVE MEANS																	
PEAKS			FOURIER COEFFICIENTS					I SINE WAVE FIT					SP				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH
1	-418	792	63	902	332.4	-278	753	43	806	339.5	20	16	-389	833	-34	924	335.0
2	-450	818	63	938	331.4	-381	762	29	863	334.0	18	14	-436	854	-35	963	333.1
3	-430	835	67	945	332.7	-400	746	49	855	332.1	16	13	-435	854	-38	962	333.1
4	-418	848	73	951	333.7	-398	768	47	872	332.8	14	11	-425	862	-38	964	333.8
5	-428	843	77	951	333.0	-389	743	58	849	332.4	16	14	-433	855	-36	963	333.1

ONE MINUTE STANDARD DEVIATIONS																				
PEAKS				I.				FOURIER COEFFICIENTS				I					SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U				
1	154	32	20	43	9.7	85	74	78	39	7.5	127	18	15	38	7.6	7.6				
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
3	96	102	25	52	7.9	75	16	63	52	3.8	55	87	30	53	5.3	5.3				
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5	122	82	44	13	8.9	202	140	11	26	18.1	161	62	22	23	10.2	10.2				

CUMULATIVE STANDARD DEVIATIONS																	
PEAKS			I.			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	TH	
1	154	32	20	43	9.7	85	74	78	39	7.5	127	18	15	38	7.6	7.6	
2	122	50	14	70	7.0	148	54	60	102	10.9	121	39	11	74	6.3	6.3	
3	103	67	17	56	6.6	141	45	60	77	8.3	90	52	17	59	5.2	5.2	
4	96	68	21	53	6.4	126	66	54	81	7.6	84	49	16	53	4.9	4.9	
5	95	66	25	45	6.4	132	90	50	81	9.4	95	49	16	45	5.8	5.8	

Fig. 4-17 - Wind Data Measured at 540m Altitude with Low Clouds

Table 4-2

METEOROLOGICAL CONDITIONS FOR WIND MEASUREMENT  
IN LOW CLOUDS, HUNTSVILLE-MADISON COUNTY AIRPORT

8:55 CST

Clouds: 800 ft Thin Broken, 1600 ft Overcast  
Visibility: 2-1/2 Miles in Light Drizzle and Fog  
Wind: 320 deg at 10 knots

9:55 CST

Clouds: 400 ft Thin Broken, 800 ft Overcast  
Tops Reported at 7000 MSL  
Visibility: 1-1/2 Miles in Light Drizzle and Fog  
Wind: 330 deg at 14 knots

10:55 CST

Clouds: 600 ft Overcast  
Tops Reported at 7200 MSL  
Visibility: 2 Miles in Light Drizzle and Fog  
Wind: 340 deg at 12 knots

this condition occurs, the wind angle is erroneous by exactly 180 deg. The wind speed is correct. The u and v components are correct in magnitude for each VAD scan; but are wrong in sign.

The one minute averages for which this condition occurs can be clearly identified in the data. Since it is known that there are six scans in every one minute average and the angle of one or more of the scans is wrong by 180 deg, the standard deviation of the one minute mean of the wind angle will exceed 60 deg if the condition occurs. Similarly, the standard deviation of both the u and v components must exceed 74% of their respective mean values. To see this, assume that the true value from each scan of a one minute average is a. Therefore, for 6 scans in the one minute average, the expected value and expected value of the square are

$$E(X^2) = 6a^2/6 \quad E(X) = 6a/6$$

and the Variance is

$$E(X^2) - E^2(X) = a^2 - a^2 = 0$$

If one of the six values has the wrong sign,

$$E(X^2) = 6a^2/6 \quad E(X) = 4a/6$$

and the variance is

$$E(X^2) - E^2(X) = a^2 - (4a/6)^2 = 0.52a^2$$

or the standard deviation is 0.74 a. Thus the condition described above is suspected if the standard deviations of both the u and v components exceeds 74% of their respective mean values for the one minute average.

In some conditions (e.g., 43 m data of 14 September 1976 ending at 10:40:00) the standard deviation for winds calculated from the sine algorithm may indicate that this condition exists, whereas the standard deviation for the peak algorithm indicates that the problem does not exist. When this condition occurs, the wind data calculated with the peak algorithm can be expected to give more reliable data than the wind data calculated with the sine algorithm.

It is noted that this condition occurs only rarely for the light winds of 16 September and never for the higher winds of 18 September. The higher winds are less susceptible to wind speed changes of more than 90 deg.

This limitation of the Lockheed LDV as configured for the test has been recognized in the past. A translator is currently being installed in the Lockheed system, and translators have been installed in the LDV systems built for the U.S. Army Missile Command and Department of Transportation. The presence of a translator removes all ambiguity associated with the direction of the wind and solves the problem described. It also obviates the need for estimates of wind direction to be made by the system operator. The absence of a translator has caused no problem in past measurements of wind using the VAD mode. However, it is clear that a translator will be necessary for measurement of wind in light and variable conditions.

## Section 5

### CONCLUSIONS AND RECOMMENDATIONS

The ability of the laser Doppler velocimeter to measure winds in fog has been demonstrated. The continuity of the data recorded and the quantity of data recorded were adversely affected by the secondary purpose of the test. This purpose was the measurement of laser attenuation in fog and required that the laser power be kept constant within limits more restrictive than required by wind measurements alone.

The addition of a translator (to distinguish between positive and negative line-of-sight velocities) and real time data processing will further enhance the ability of the LDV to measure winds in fog. Both of these additions are planned for 1977. The ability of the LDV to measure wind in patchy fog or in fog and clear air above the fog is enhanced by the use of the logarithmic scale of laser intensity rather than the linear scale.

It is recommended that the future activities of the Lockheed LDV and the Department of Transportation LDV be monitored. It is likely that both of these units will take data in fog in their normal use.

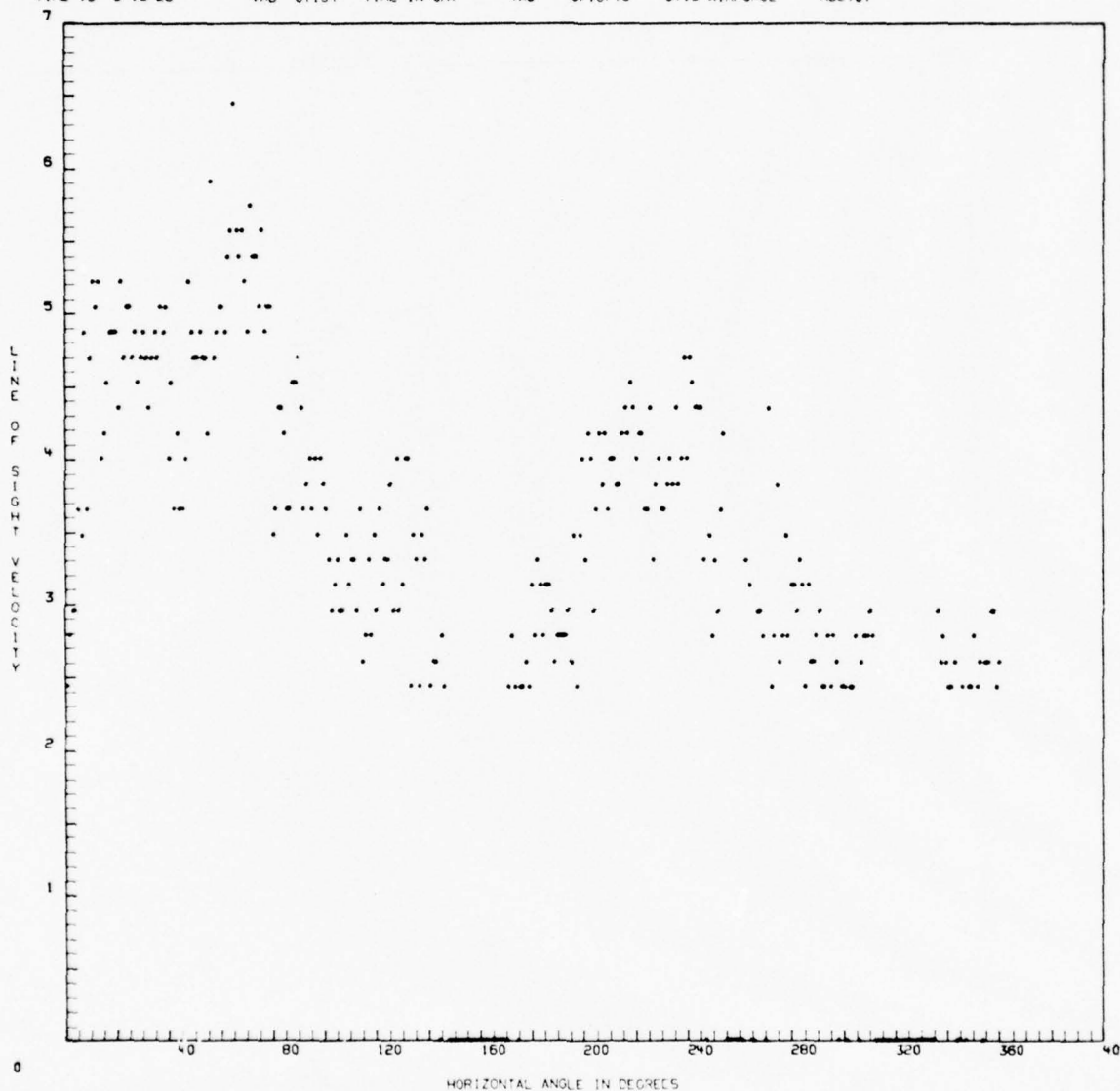
Section 6  
REFERENCES

1. Little, B. et al., "Remote Sensing of Wind Profiles in the Boundary Layer," ESSA Technical Report ERL 168-WPL12, June 1970.
2. Lawrence, T.R., et al., "A Study on Laser Doppler Velocimeter Atmospheric Wind Interrogation Systems - Final Report," LMSC-HREC TR D306888, Lockheed Missiles & Space Company, Huntsville, Ala., October 1973.
3. Bilbro, J.W., et al., "Development of a Laser Doppler System for the Detection, Tracking, and Measurement of Aircraft Wake Vortices," FAA-RD-74-213, March 1975.
4. Bilbro, J.W., et al., "Laser Doppler Velocimeter Wake Vortex Tests," NASA TM X-64988, March 1976.
5. Brashears, M.R., T.R. Lawrence, and A.D. Zalay, "Mobile Laser Doppler System Check Out and Calibration," LMSC-HREC TR D497036, Lockheed Missiles & Space Company, Huntsville, Ala., September 1976.
6. Brashears, M.R., and W.R. Eberle, "Verification of Wind Measurement with Mobile Laser Doppler System," LMSC-HREC TR D497071, Lockheed Missiles & Space Company, Huntsville, Ala., November 1976.

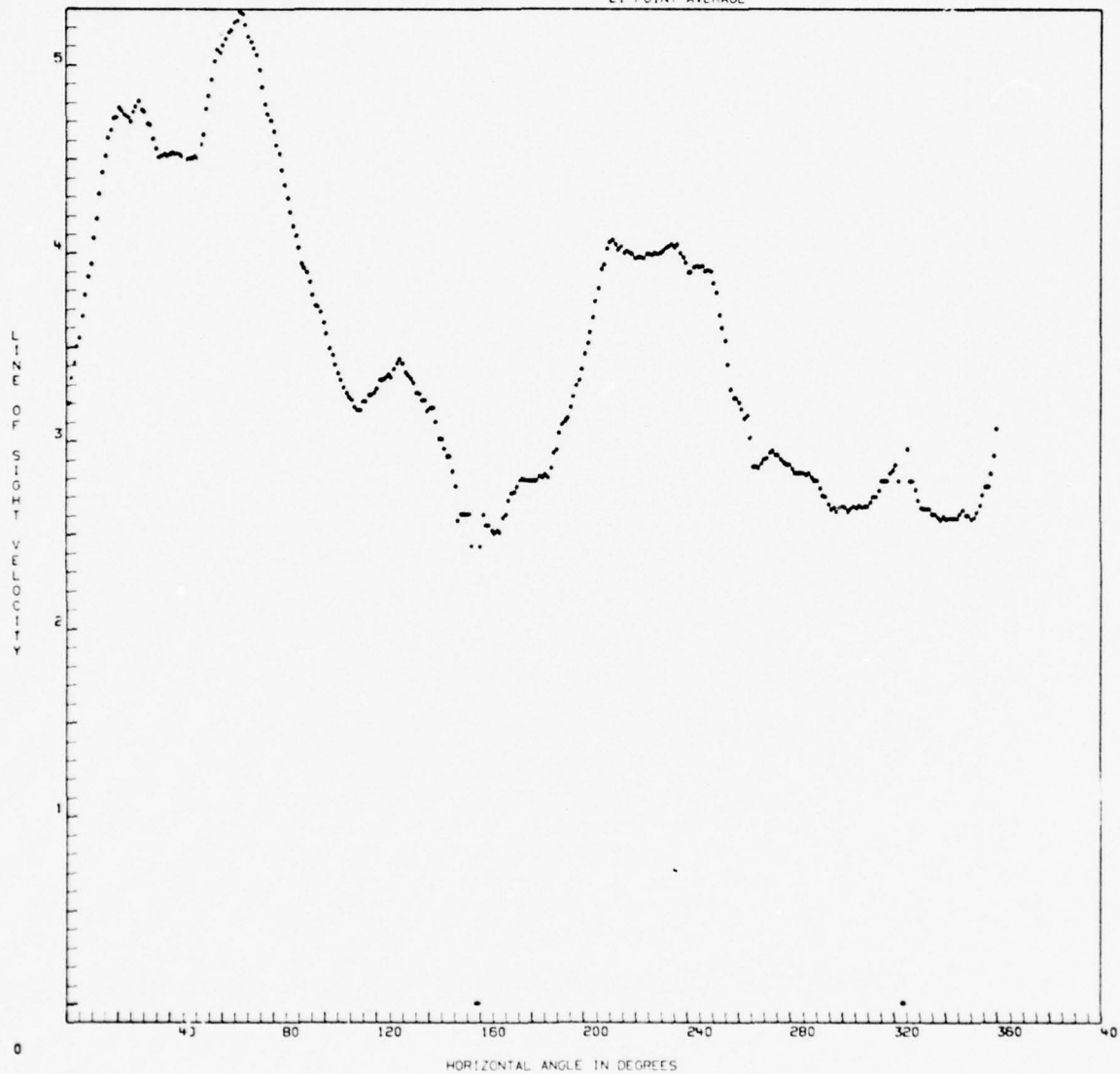
Appendix A

SAMPLE LDV SIGNATURES FOR OPERATION IN THE VAD  
MODE AT OTIS AFB, MASSACHUSETTS - SEPTEMBER 1976

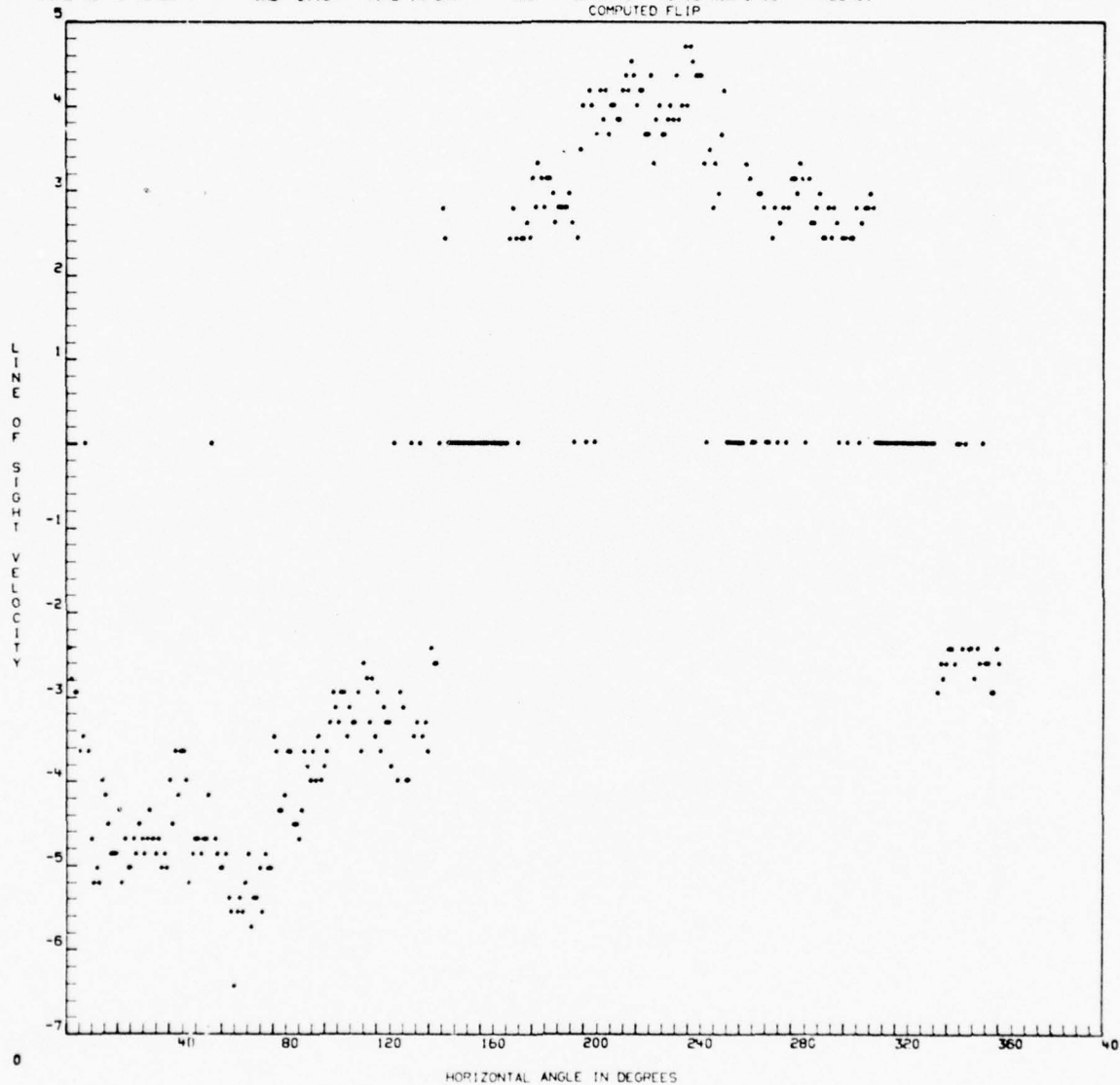
ALTITUDE IS 91.8 FEET  
 TIME IS 3:16:26 VAD OTIS4 TIME IN GMT VAD 9/18/76 OTIS AIRFORCE HQ270.



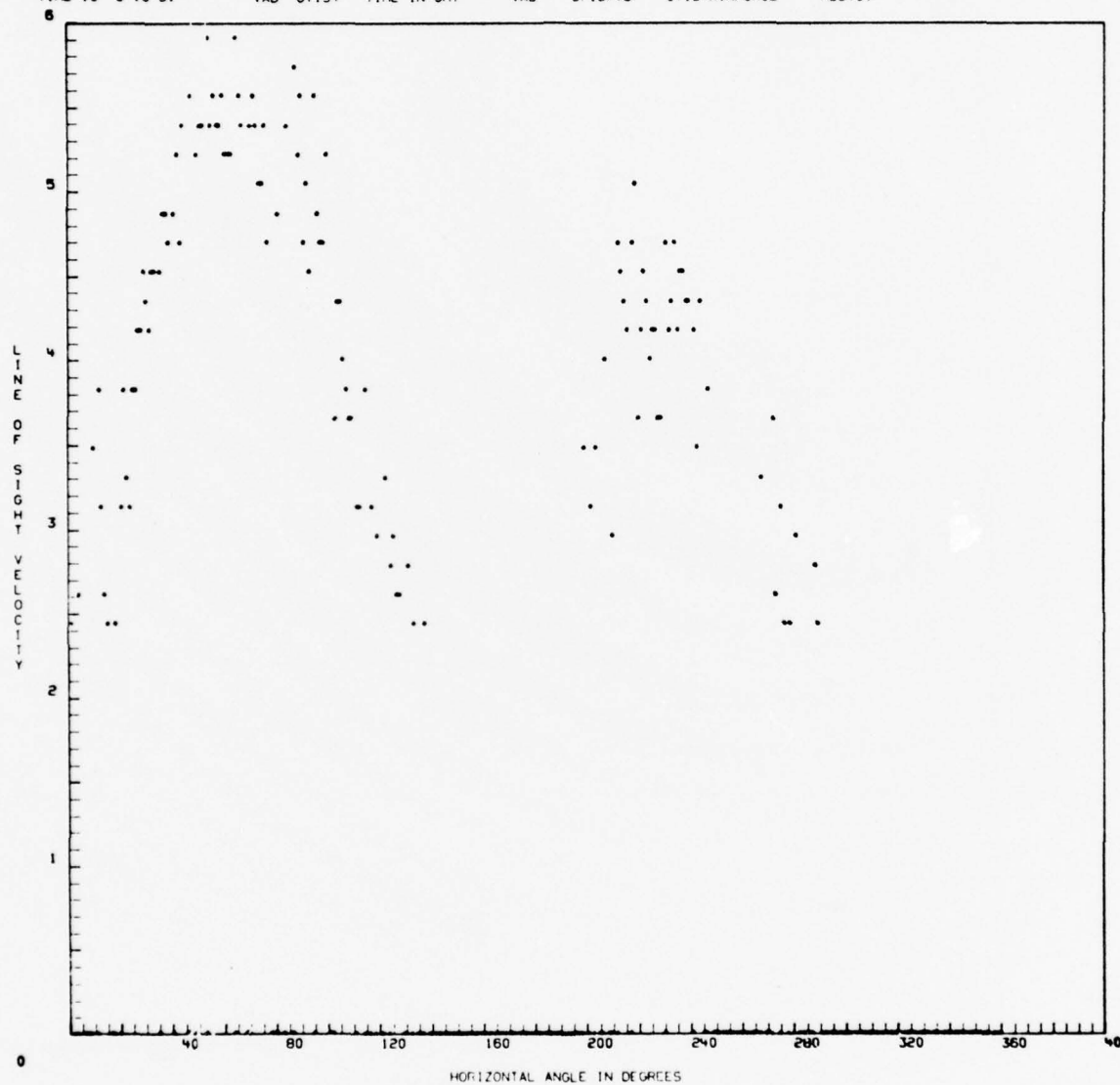
ALTITUDE IS 91.8 FEET  
TIME IS 3:16:26  
VAD OTIS4 TIME IN GMT  
RUN NO. 1  
VAD 9/18/76 OTIS AIRFORCE HD270.  
21 POINT AVERAGE



ALTITUDE IS 91.8 FEET  
 TIME IS 3:16:26 VAD 01154 TIME IN GMT VAD 9/18/76 OTIS AIRFORCE HD270.  
 RUN NO. 1  
 JOB NO SHRIDR PAGE 4  
 COMPUTED FLIP



ALTITUDE IS 141.0 FEET  
 TIME IS 3:16:31 VAD 07154 TIME IN GMT RUN NO. 1  
 VAD 9/18/76 OTIS AIRFORCE JOB NO SHRIDR PAGE 5  
 HD270.



ALTITUDE IS 141.0 FEET

TIME IS 3:16:21

VAD OTIS4 TIME IN GMT

RUN NO. 1

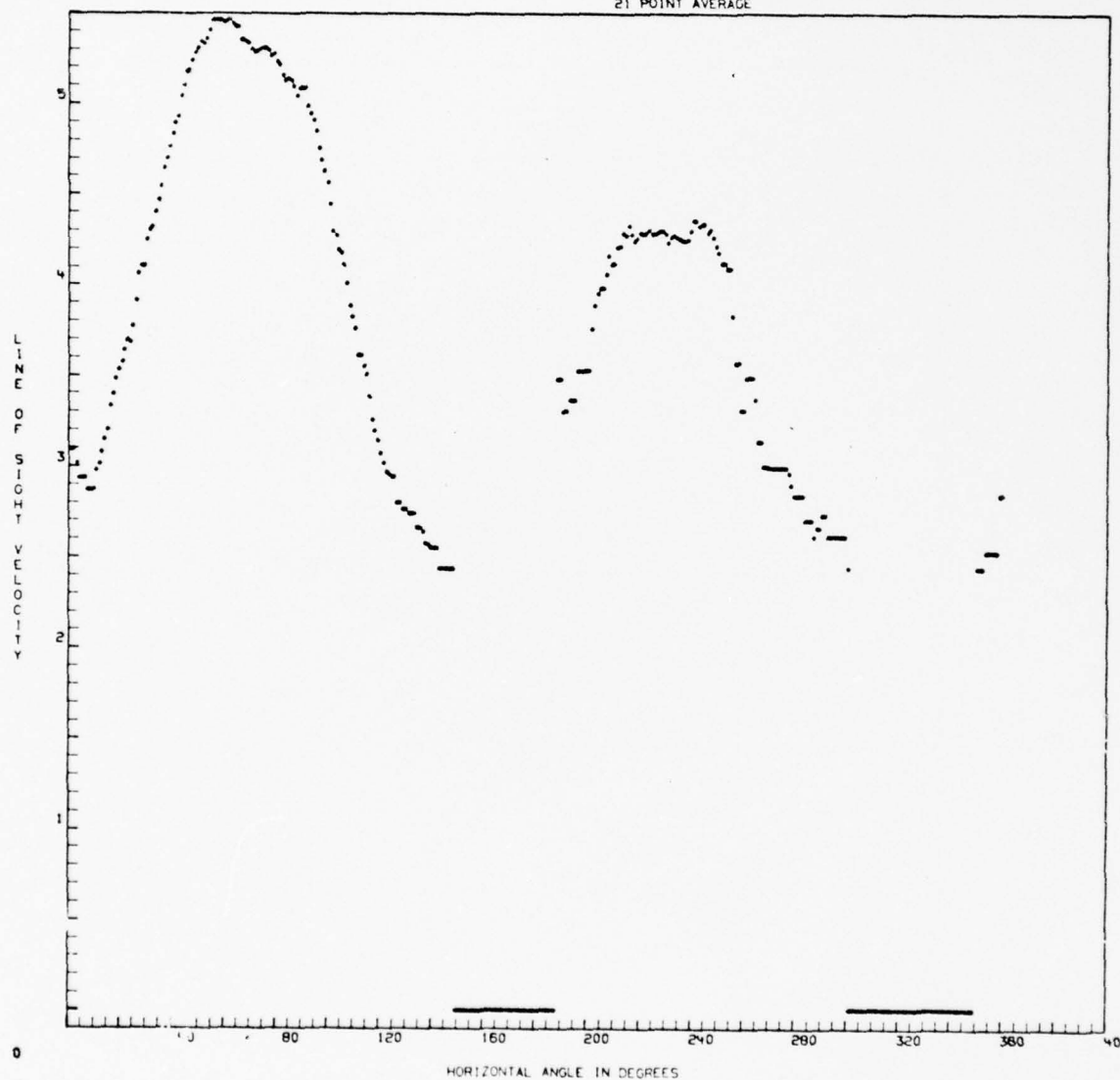
VAD 9/18/76 OTIS AIRFORCE

JOB NO SHRIDR

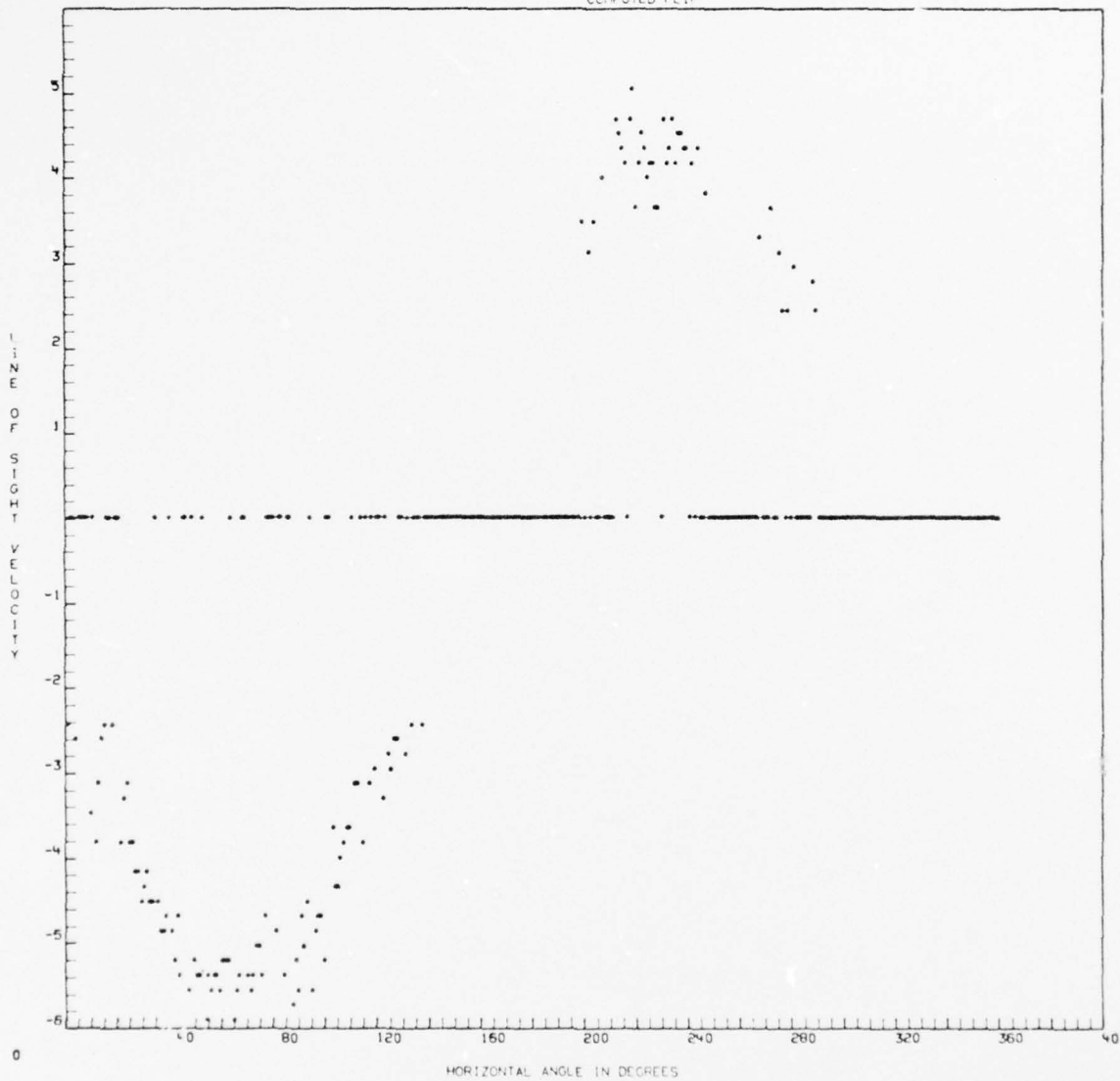
PAGE 6

HD270.

21 POINT AVERAGE



ALTITUDE IS 141.0 FEET  
 TIME IS 3:16:31  
 VAD OTIS4 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76 OTIS AIRFORCE  
 COMPUTED FLIP  
 JOB NO 54R10R  
 PAGE 7



ALTITUDE IS 91.8 FEET  
TIME IS 3:16:33

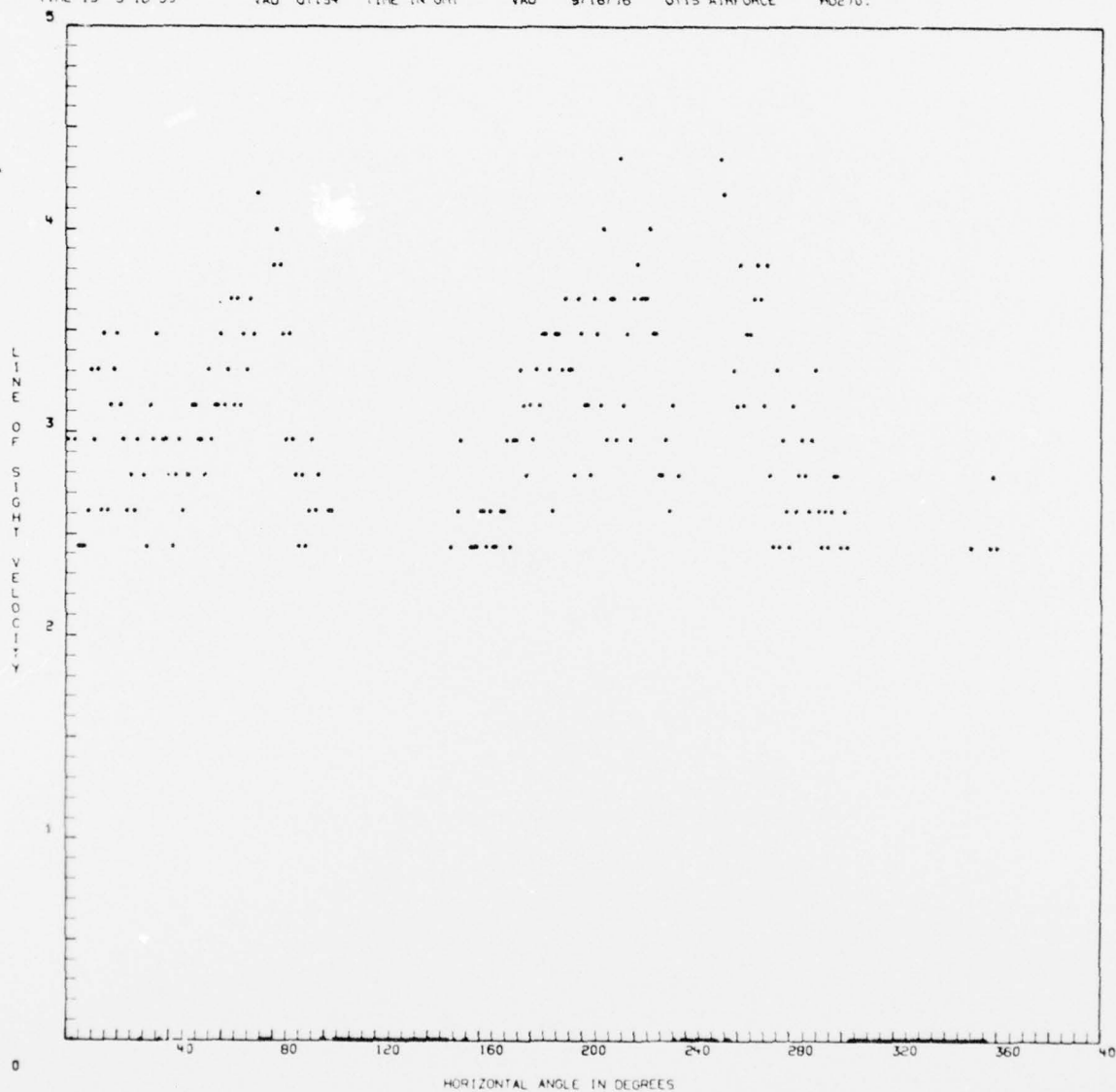
VAD 0154 TIME IN GMT

RUN NO. 1  
VAD 9/18/76

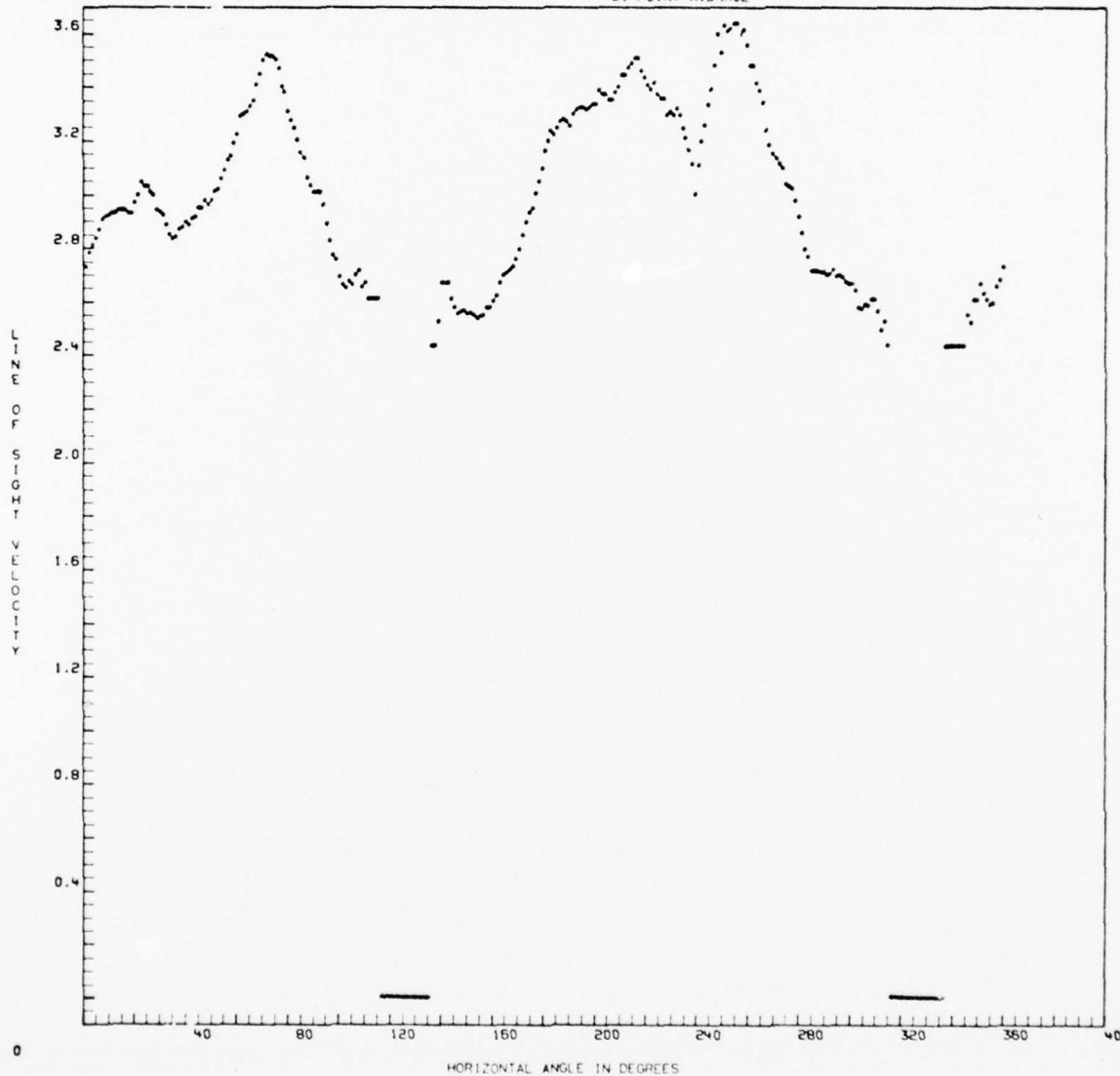
OTIS AIRFORCE

JOB NO. SHRIDR  
H0270.

PAGE 8



ALTITUDE IS 91.8 FEET  
 TIME IS 3:16:39  
 VAD 07154  
 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76  
 OTIS AIRFORCE  
 21 POINT AVERAGE  
 JOB NO 5HR1DR  
 H0270.  
 PAGE 9



ALTITUDE IS 91.8 FEET  
TIME IS 3:16:35

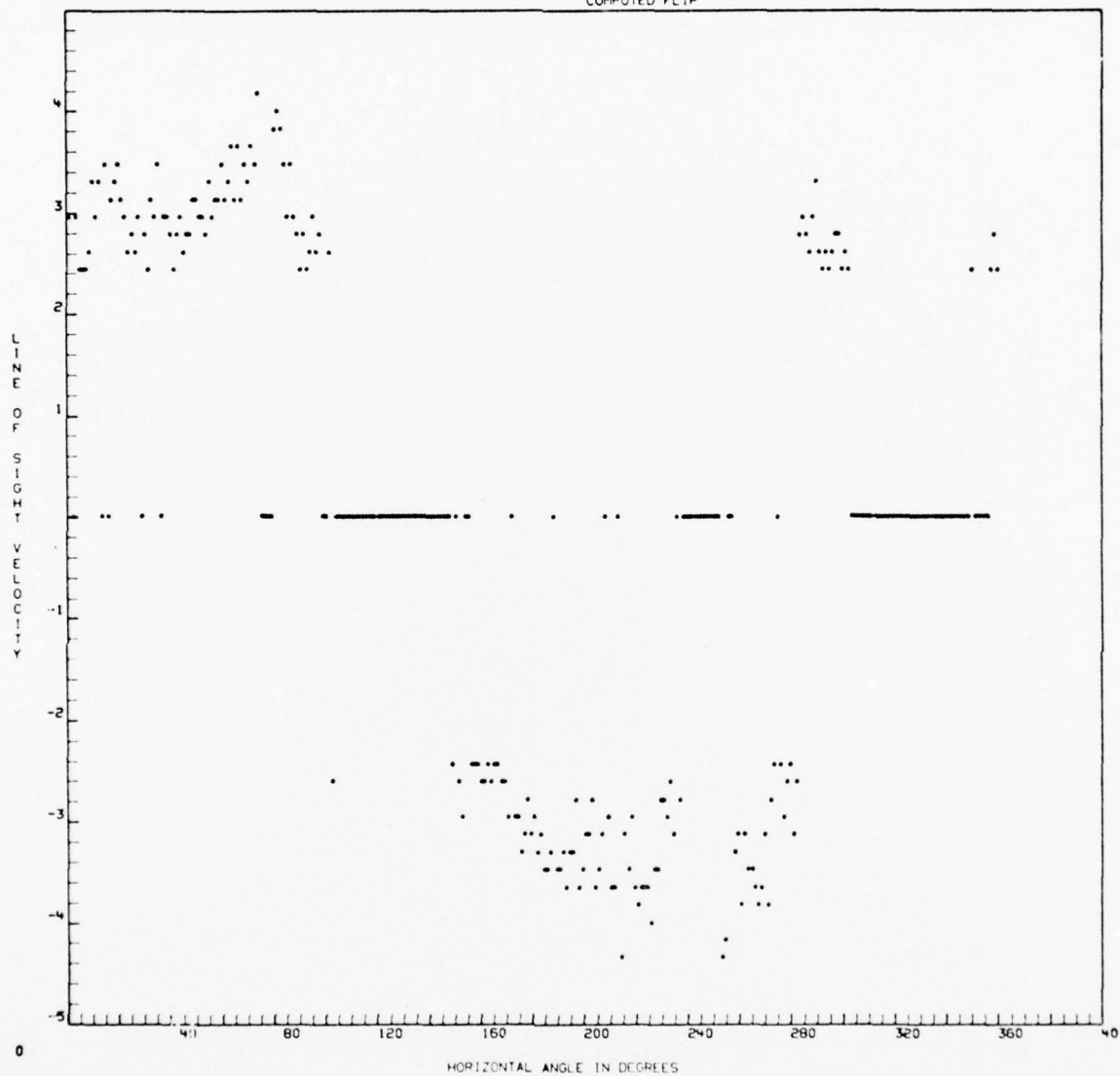
VAD OTISW TIME IN GMT

RUN NO. 1

VAD 9/18/76 OTIS AIRFORCE  
COMPUTED FLIP

JOB NO SHRIDR  
HD270.

PAGE 10



ALTITUDE IS 141.0 FEET

TIME IS 3:16:50

VAD 01154

TIME IN GMT

RUN NO. 1

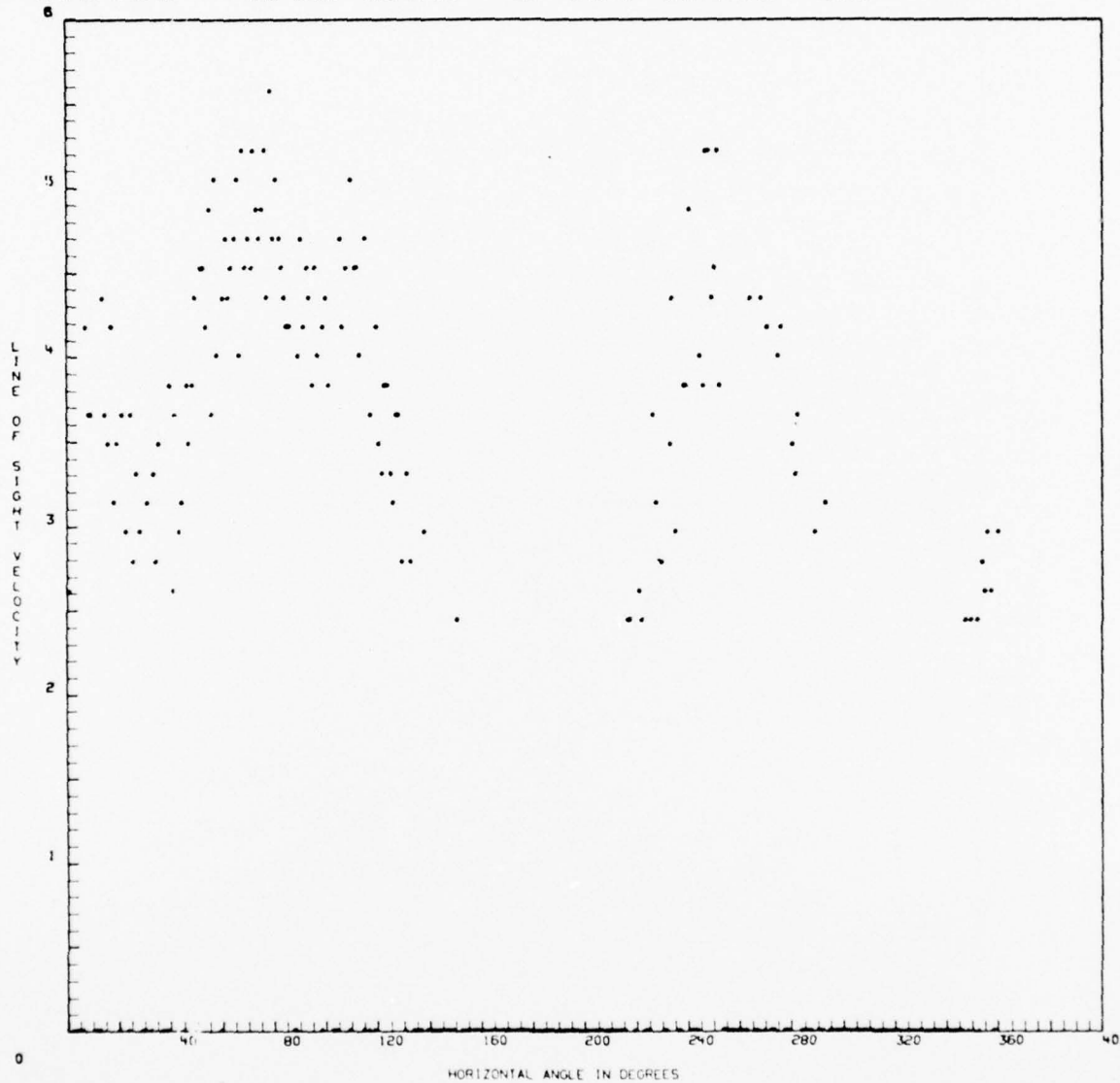
VAD 9/18/76

OTIS AIRFORCE

JOB NO 54R1DR

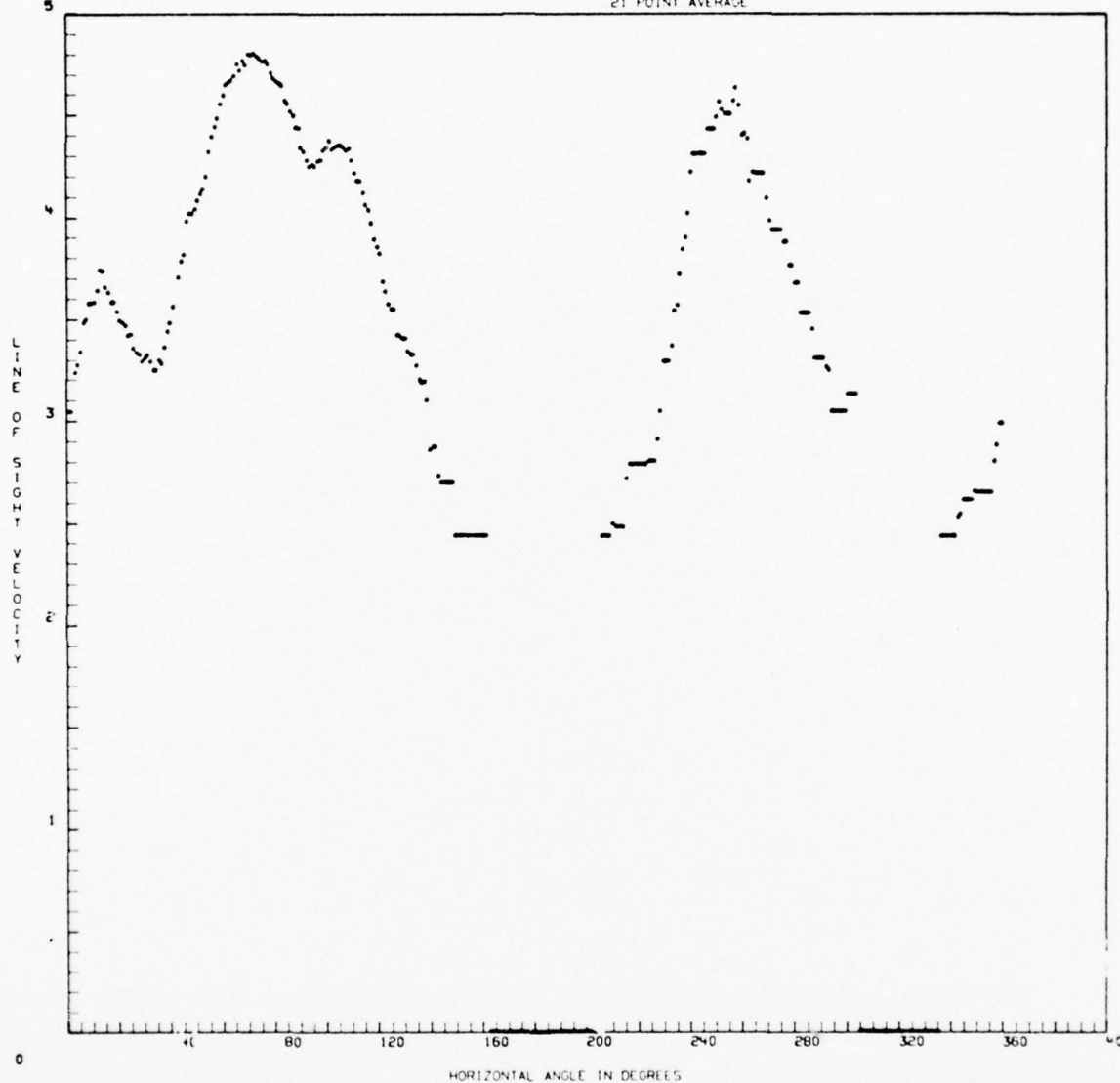
HD270.

PAGE 17

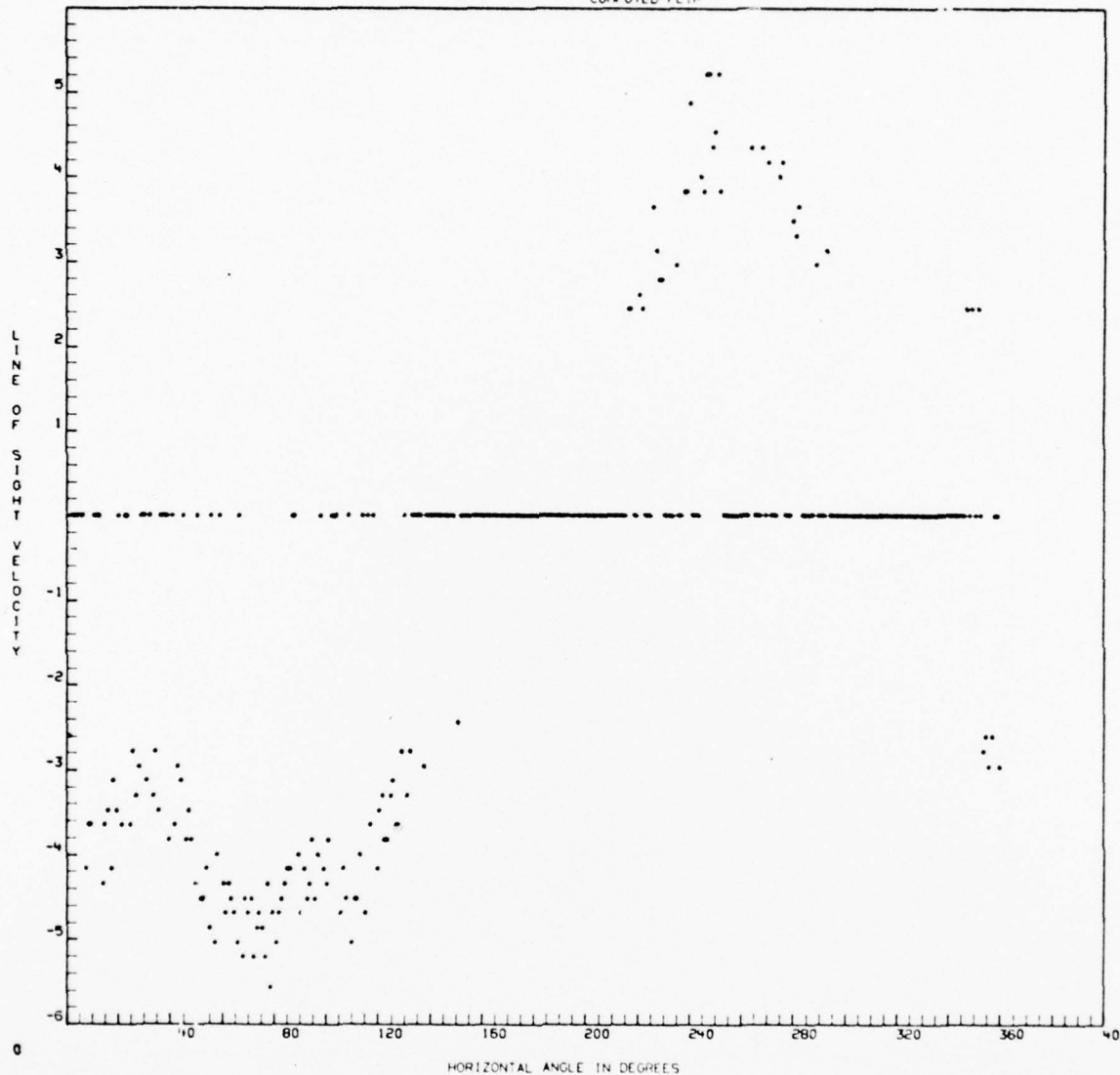


1

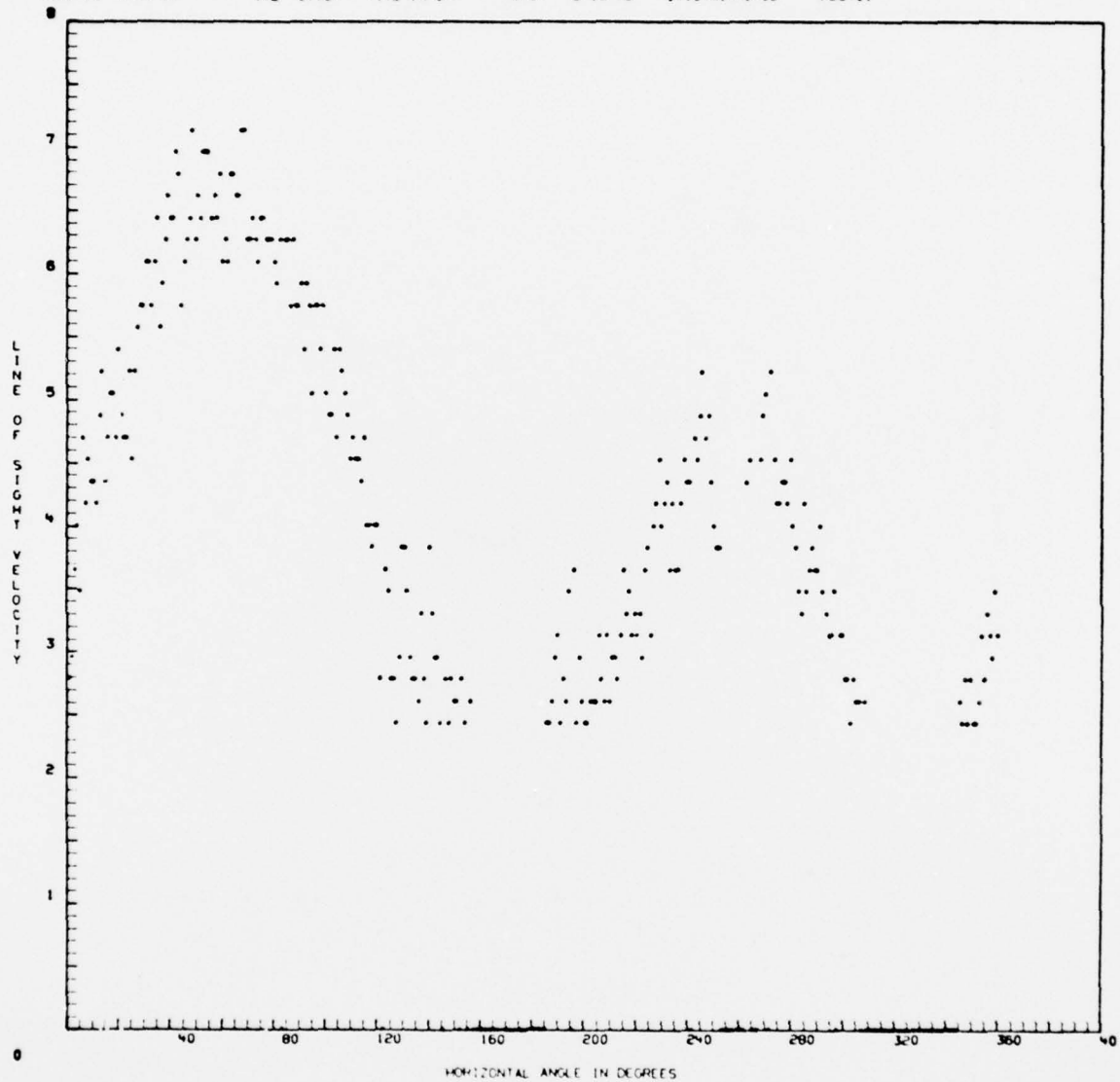
ALTITUDE IS 141.0 FEET  
TIME IS 3:16:50 VAD 07154 TIME IN GMT RUN NO. 1  
VAD 9/18/75 OTIS AIRFORCE JOB NO 5HR1DR PAGE 18  
21 POINT AVERAGE HQ270.



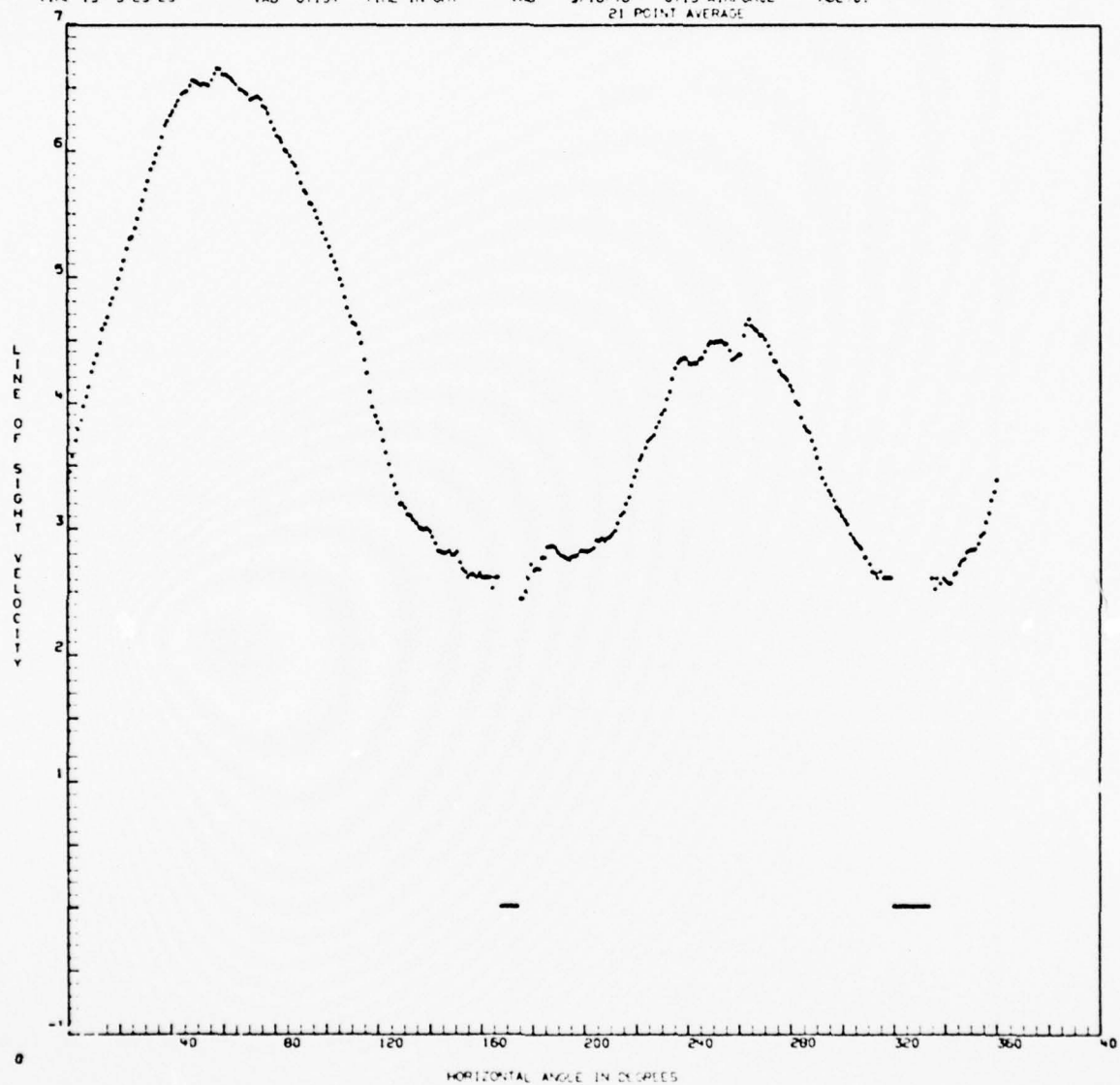
ALTITUDE IS 141.0 FEET  
 TIME IS 3:16:50 VAD OTIS4 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76 OTIS AIRFORCE  
 COMPUTED FLIP  
 JOB NO SH-10R  
 HO270.  
 PAGE 19



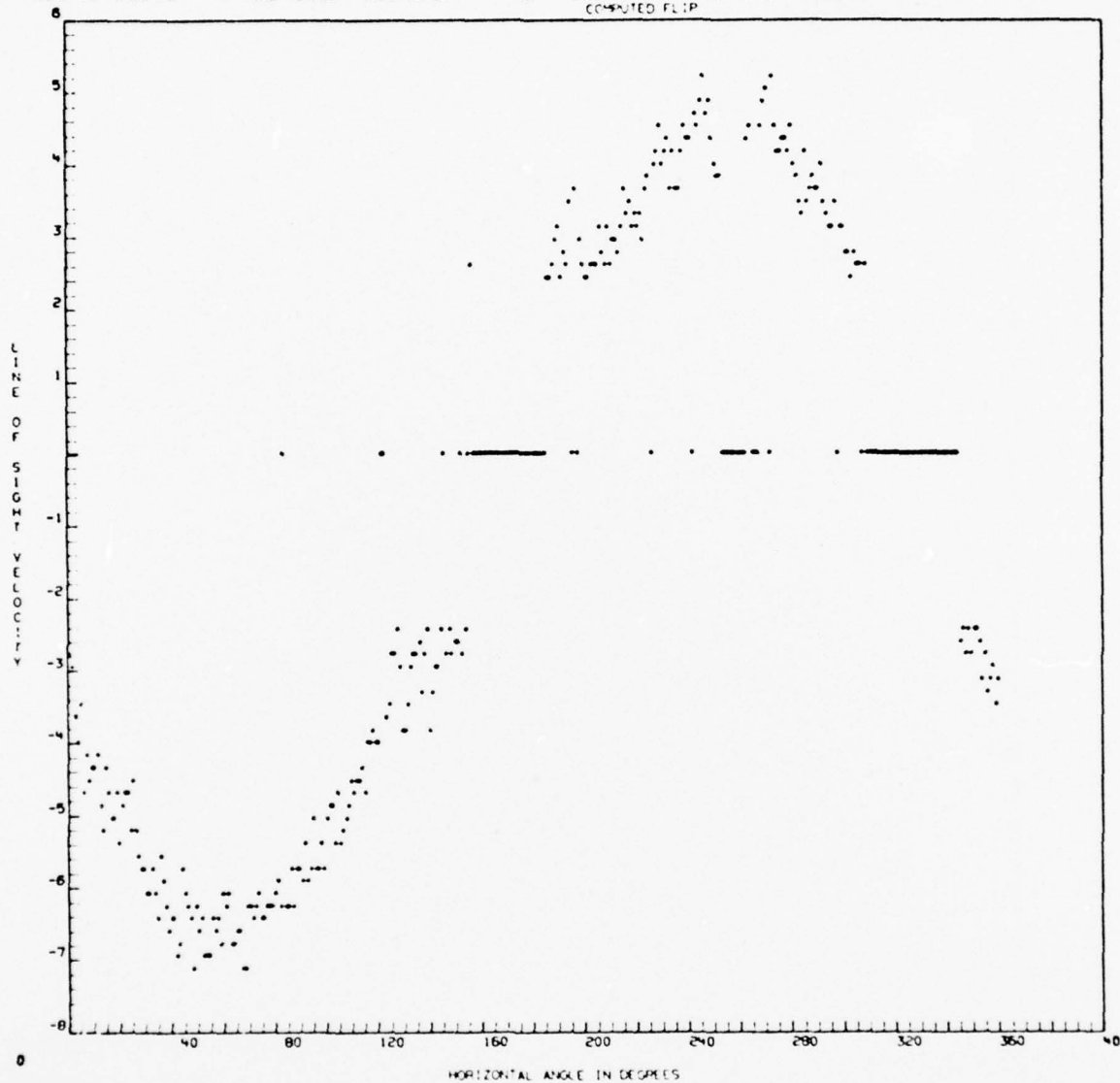
ALTITUDE IS 91.8 FEET  
 TIME IS 3:29:25 VAD OTISW TIME IN GMT RUN NO. 1  
 VAD 9/18/76 OTIS AIRFORCE JOB NO SHR10R PAGE 485  
 HD270.



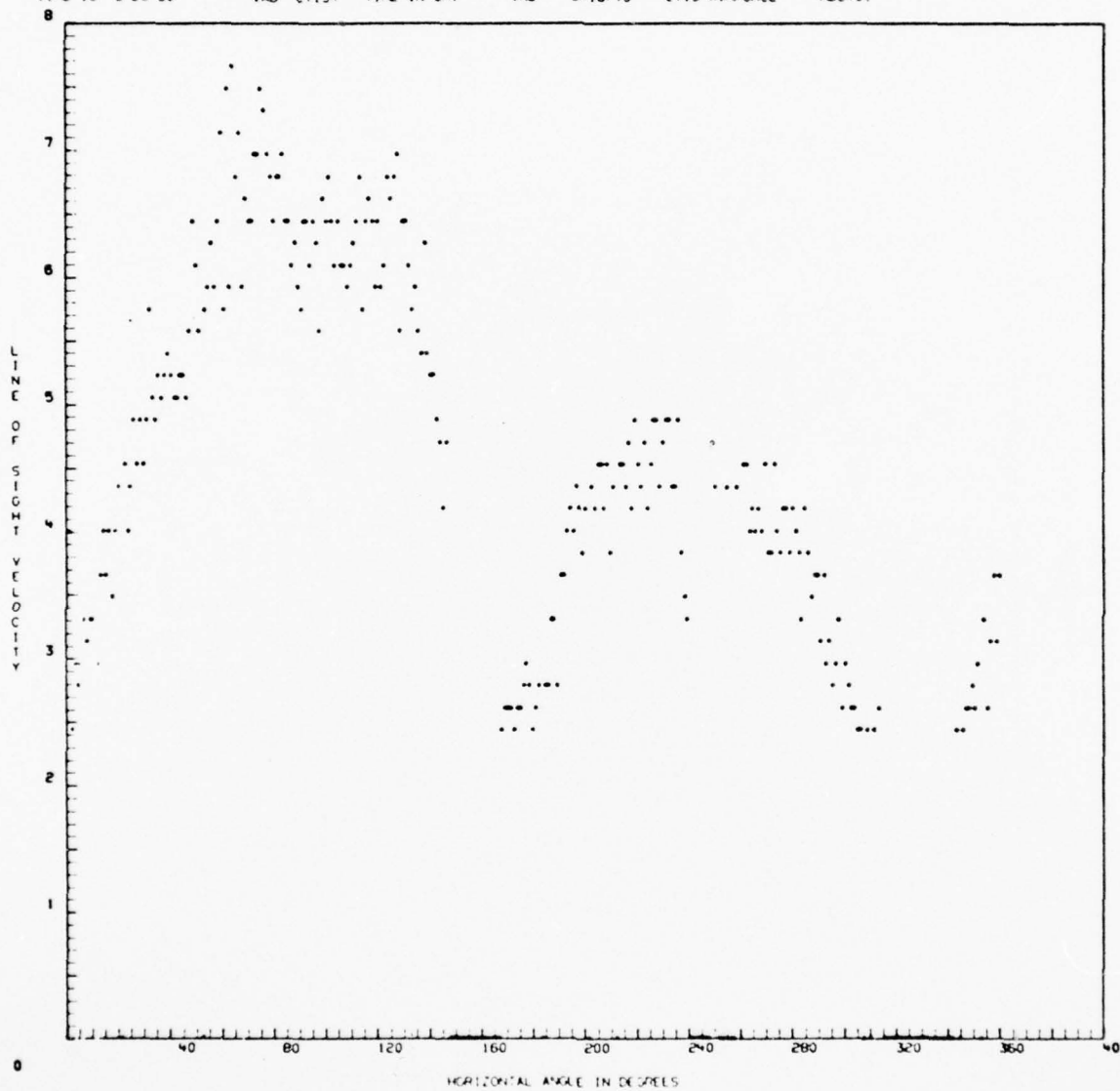
ALTITUDE 15 91.9 FEET  
 TIME 12 31'29"25 VAD 01154 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76 OTIS AIRFORCE  
 JOB NO SHRIDR  
 HD270.  
 21 POINT AVERAGE  
 PAGE 486



ALTITUDE IS 91.8 FEET  
 TIME IS 3:29:25  
 VAD 07154  
 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76  
 OTIS AIRFORCE  
 COMBATED FLIP  
 JOB NO 54P10R  
 H0270.  
 PAGE 487



ALTITUDE IS 141.0 FEET  
 TIME IS 3:29:30 VAD OTIS TIME IN GMT VAD 9/18/76 OTIS AIRFORCE JOB NO 5441DR PAGE 488  
 H0270.



ALTITUDE 15 141.0 FEET

TIME 15 3:29:30

VAD 01154

TIME IN GMT

RUN NO. 1

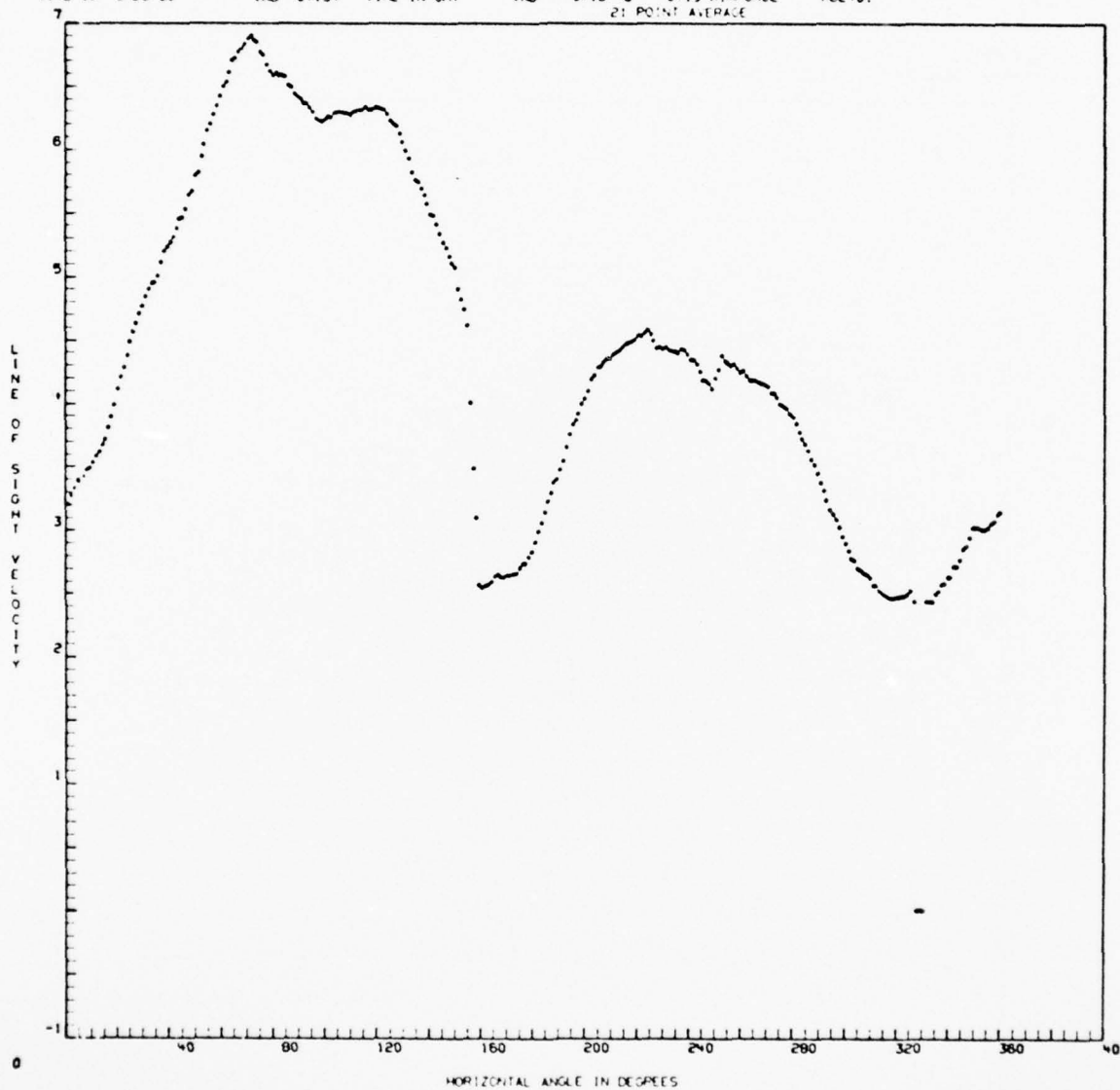
VAD 9/18/76

OTIS AIRFORCE

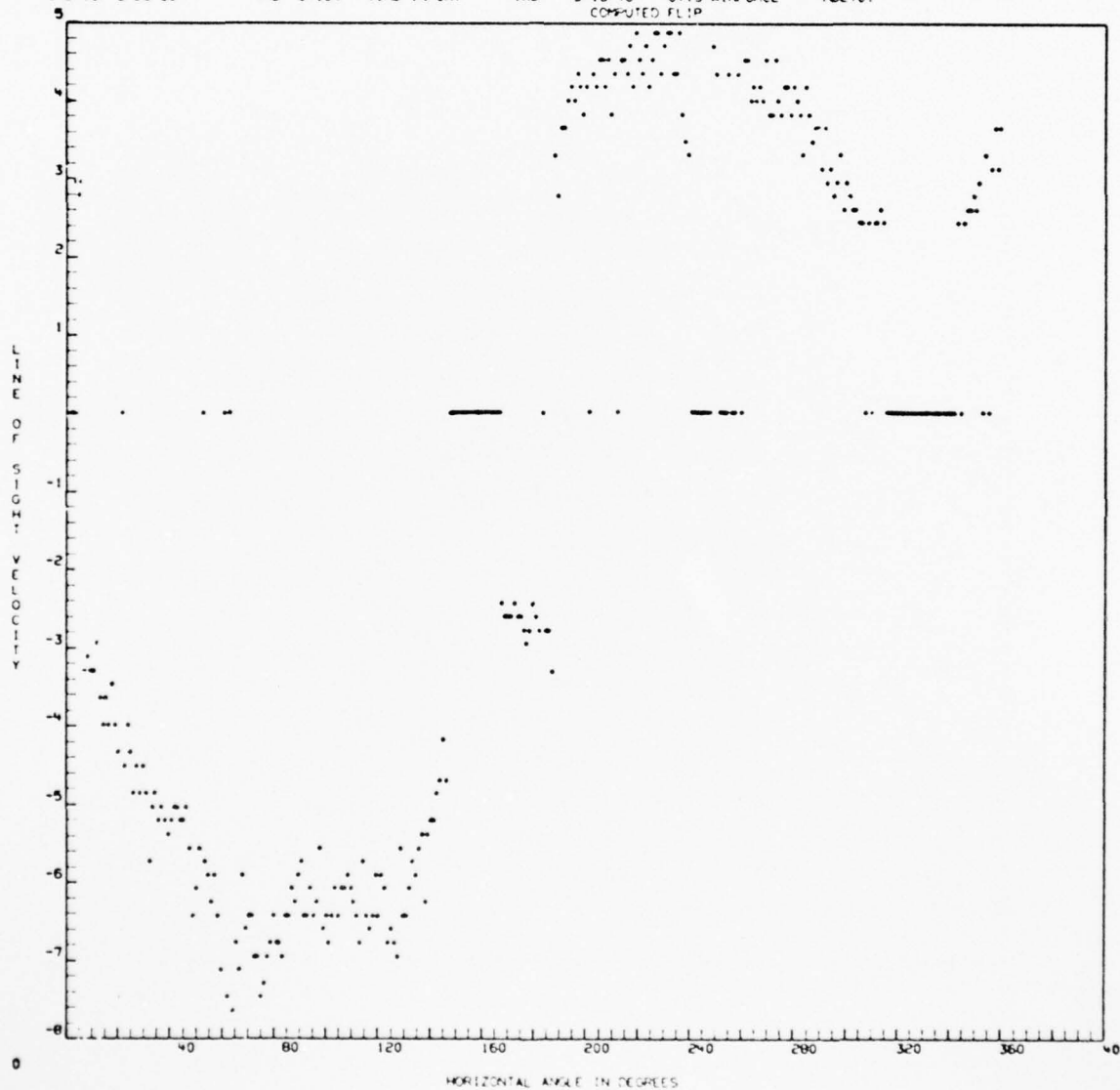
JOB NO 54110R

PAGE 489

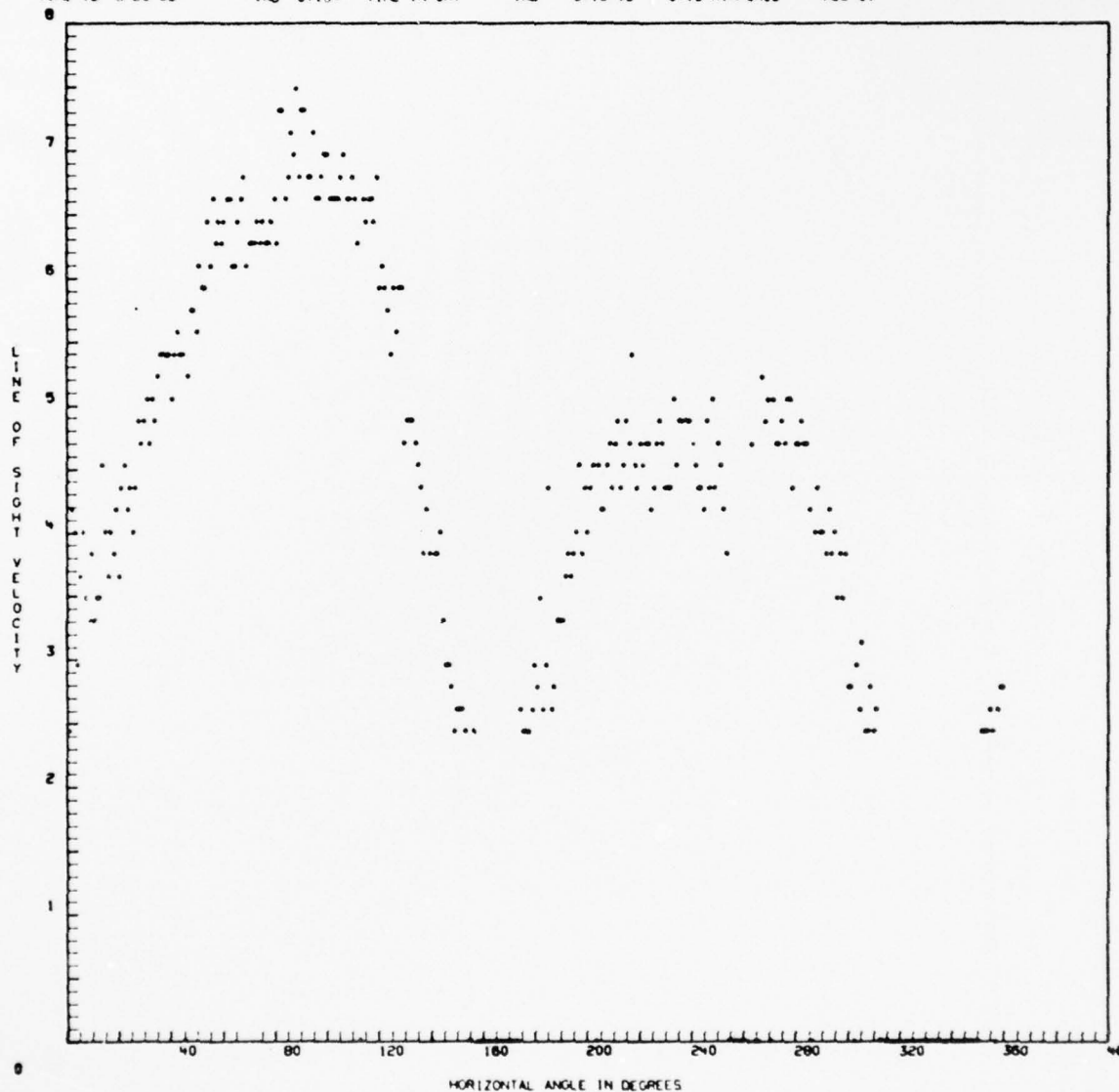
21 POINT AVERAGE



ALTITUDE IS 141.0 FEET  
 TIME IS 3:29:30 VAD 07154 TIME IN GMT VAD 9/18/76 OTIS AIRFORCE COMPUTED FLIP JOB NO SHRIDR PAGE 490  
 HO270.



ALTITUDE IS 91.8 FEET  
 TIME IS 3:29:35  
 VAD OTIS4 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/78 OTIS AIRFORCE  
 JOB NO SHR10R  
 HD270.  
 PAGE 491



AD-A038 514

LOCKHEED MISSILES AND SPACE CO INC HUNTSVILLE ALA HU--ETC F/G 4/2  
REMOTE WIND MEASUREMENT IN FOG USING LASER DOPPLER VELOCIMETRY.(U)

DEC 76 H R BRASHEARS, W R EBERLE

F19628-76-C-0237

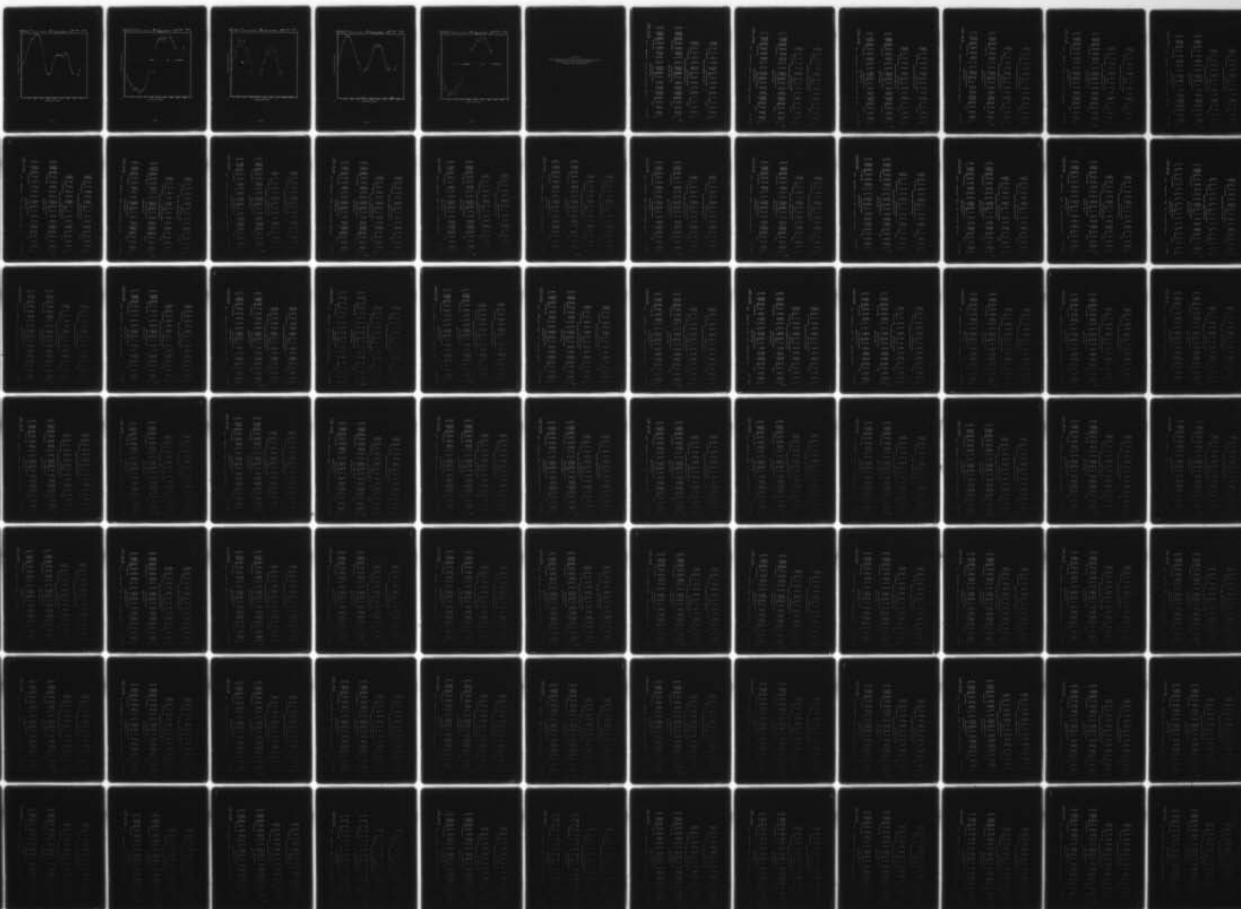
UNCLASSIFIED

LMSC-HREC-TR-D497127

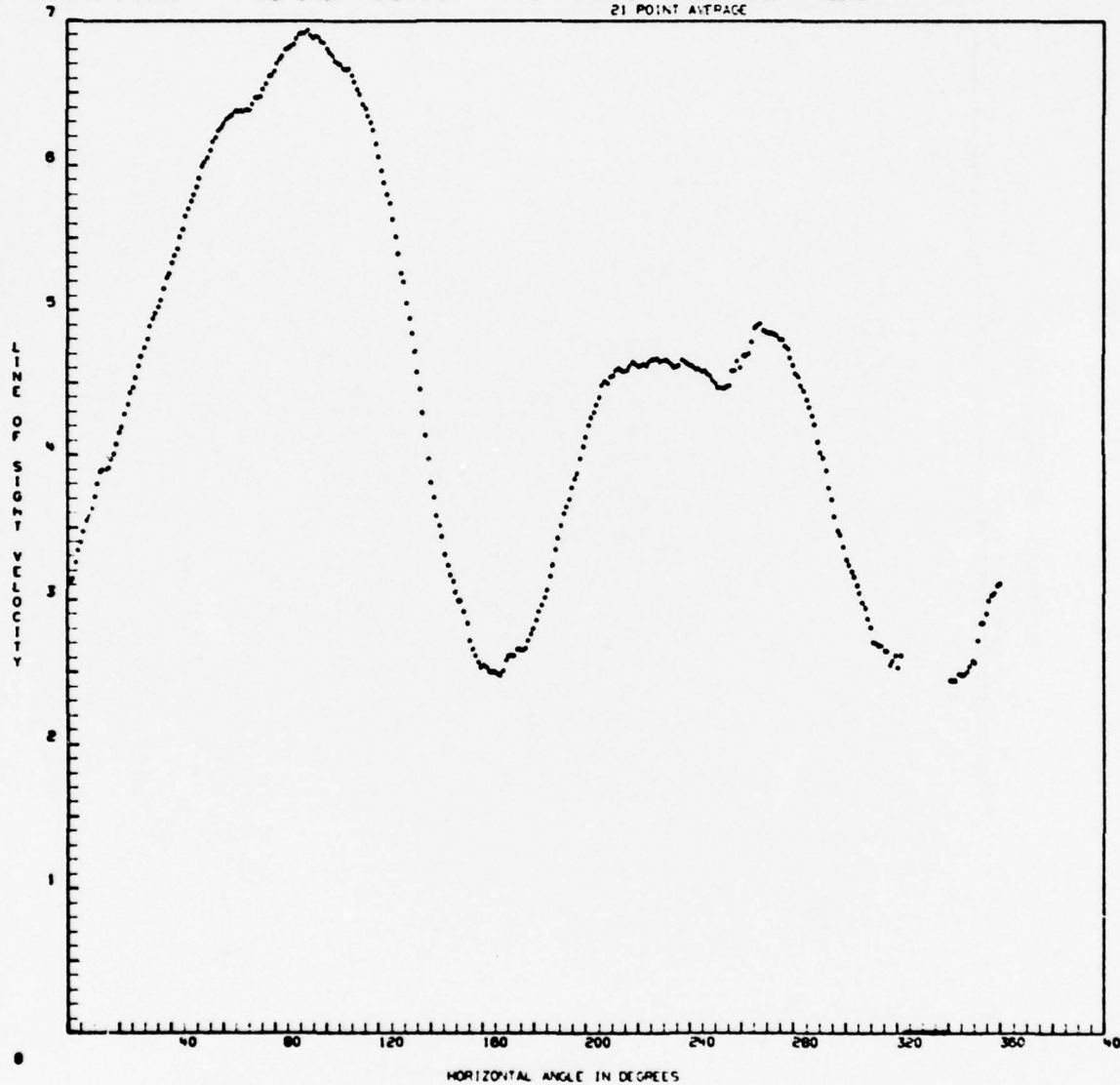
AFGL-TR-76-0313

NL

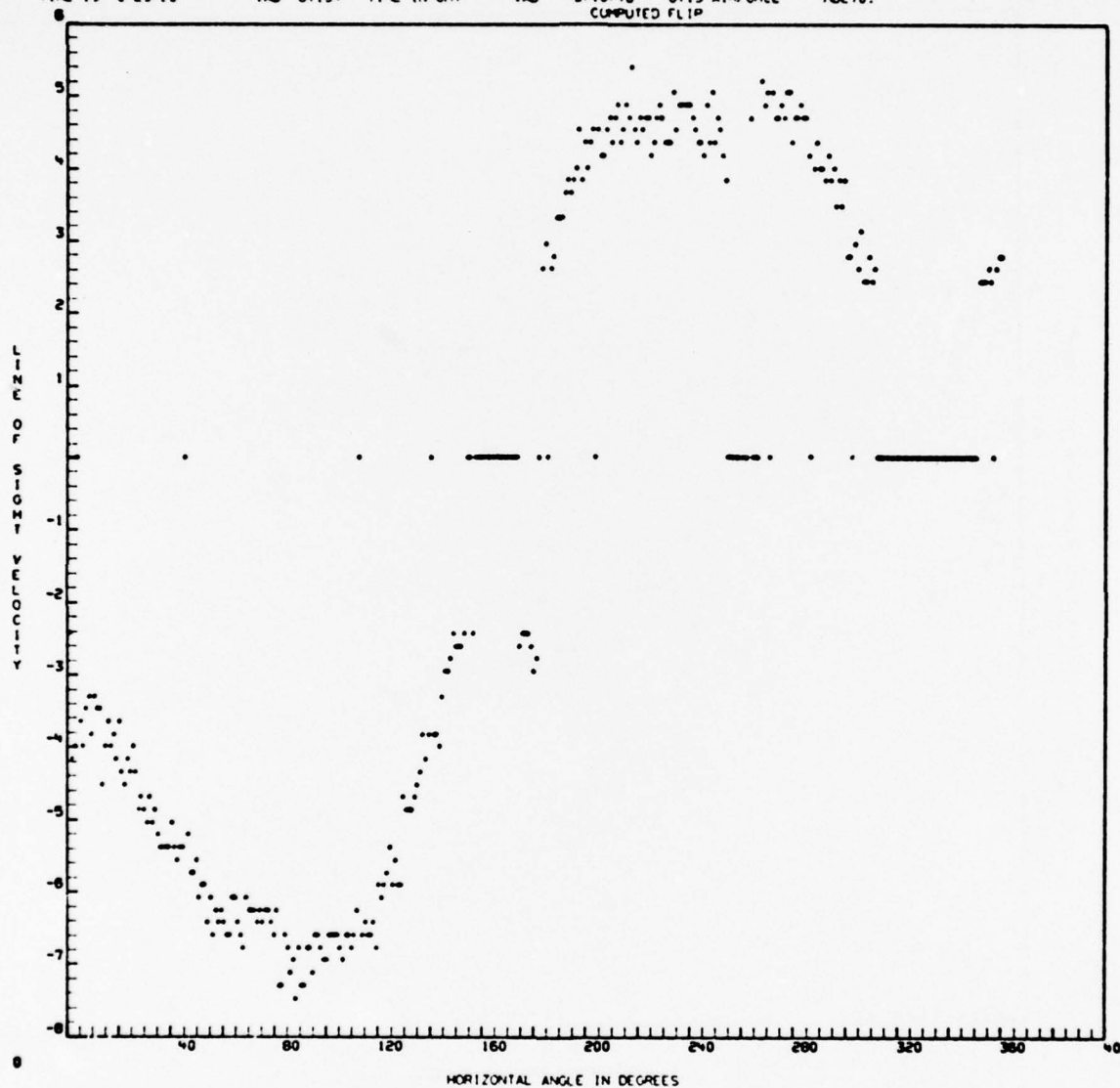
2 of 3  
ADA038514



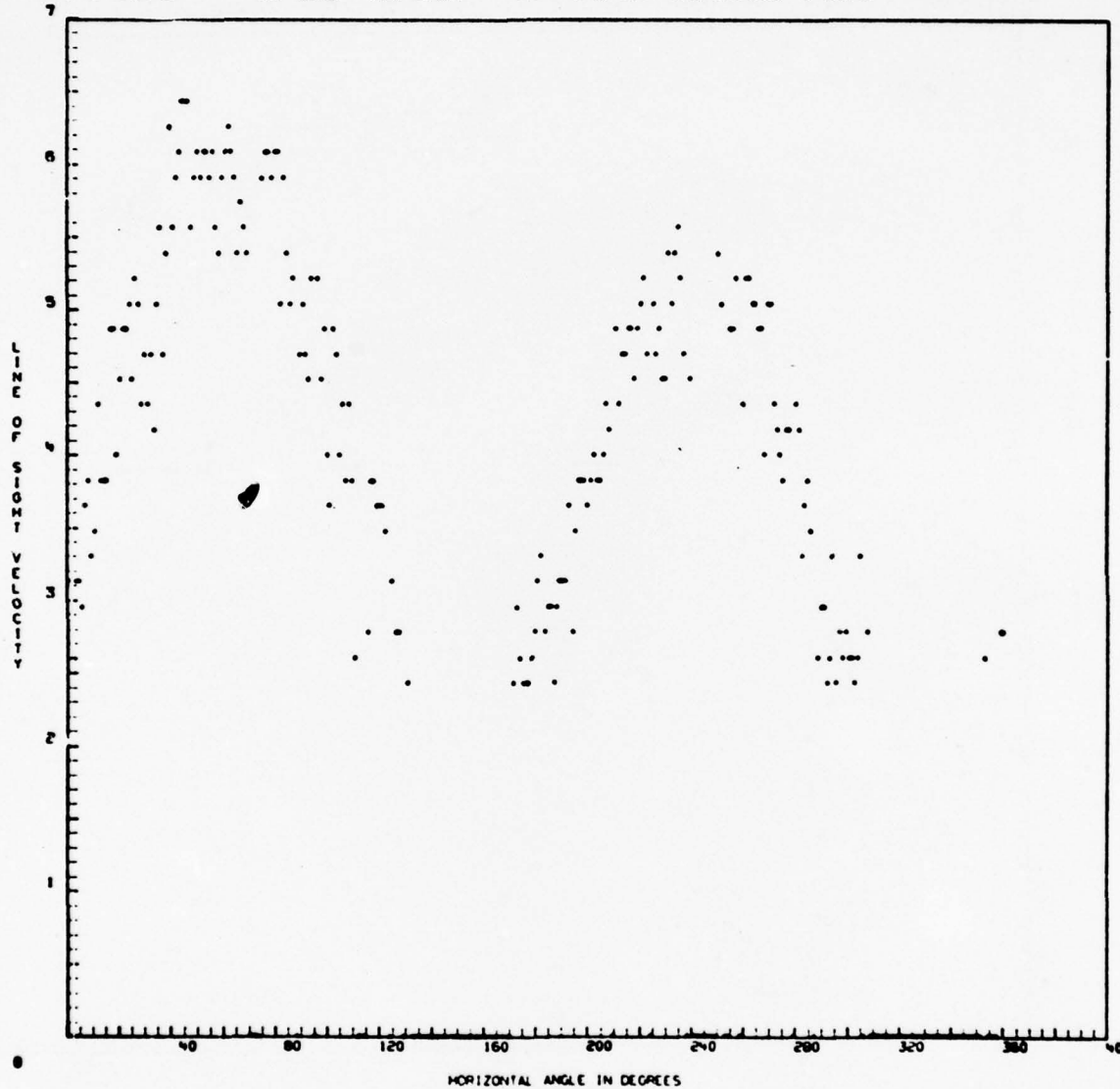
ALTITUDE IS 91.8 FEET  
TIME IS 3:29:35 VAD OTIS4 TIME IN GMT RUN NO. 1  
VAD 9/18/76 OTIS AIRFORCE HQ270. JOB NO SHRIDR PAGE 492  
21 POINT AVERAGE



ALTITUDE IS 91.8 FEET  
 TIME IS 2:29:25  
 VAD OTIS TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76 OTIS AIRFORCE  
 COMPUTED FLIP  
 JOB NO 5410R  
 PAGE 483



ALTITUDE IS 141.0 FEET  
 TIME IS 3:29:39 VAD 0154 TIME IN GHT VAD 9:18/78 OTIS AIRFORCE JOB NO SHRIDR PAGE 494  
 MD270.



ALTITUDE IS 141.0 FEET  
TIME IS 3:29:39

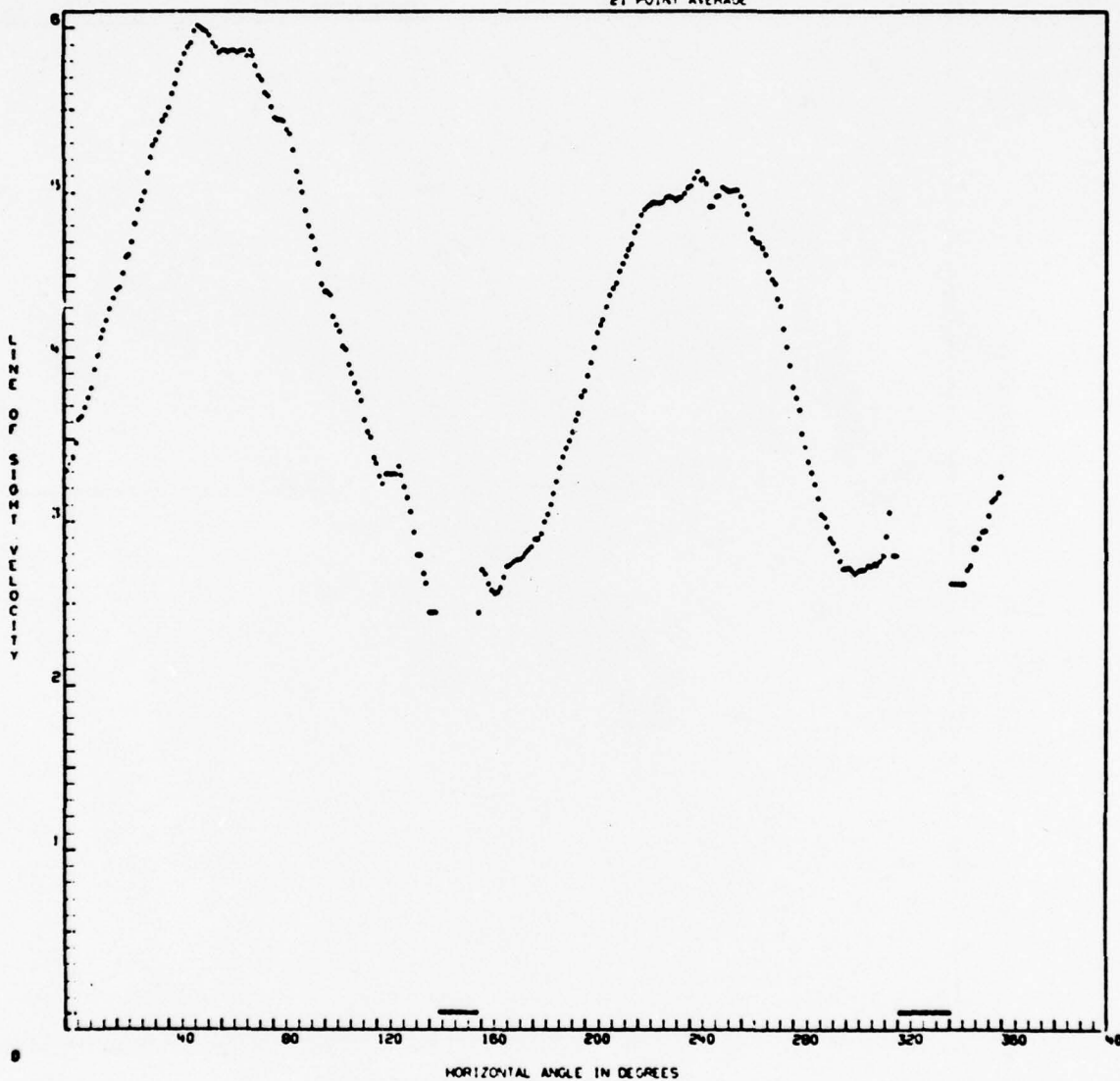
VAD 07154 TIME IN GMT

RUN NO. 1

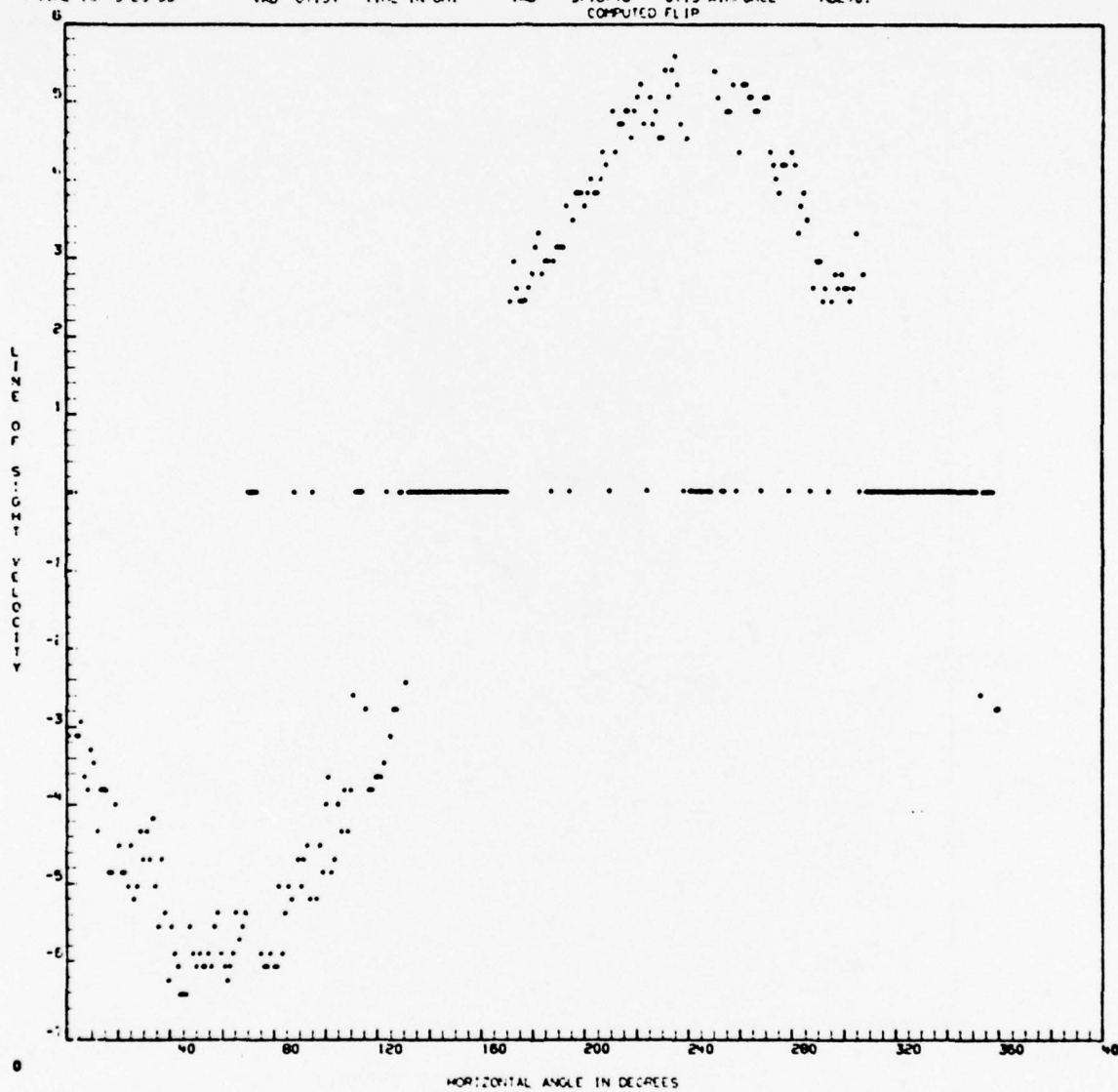
VAD 9/10/75 OTIS AIRFORCE  
21 POINT AVERAGE

JOB NO 5410R  
40270.

PAGE 485



ALTITUDE IS 141.0 FEET  
 TIME IS 3:29:39  
 VAD 07154 TIME IN GMT  
 RUN NO. 1  
 VAD 9/18/76 OTIS A. FORCE  
 COMPUTED FLIP  
 JOB NO SHRIDR  
 HD270.  
 PAGE 496



Appendix B  
TABULAR DATA FOR WIND MEASURED AT OTIS AFB,  
MASSACHUSETTS, IN FOG CONDITIONS  
DURING SEPTEMBER 1976

HEIGHT = 28. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:20:0 END TIME 9:25:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-166	162	49	234	134.3	-127	154	18	203	140.7	23	15	-138	188	-19	236	143.8	12
2	-142	185	49	237	142.4	-161	119	16	203	125.5	25	18	-172	145	-14	230	129.4	20
3	-160	175	54	238	137.4	-155	117	19	198	125.9	29	20	-173	148	-13	234	129.6	21
4	-147	180	50	234	140.7	-139	126	18	194	131.7	31	20	-157	158	-14	229	134.7	19
5	-135	173	54	221	142.0	-105	146	15	189	144.0	27	19	-117	169	-14	217	144.6	20

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-166	162	49	234	134.3	-127	154	18	203	140.7	23	15	-138	188	-19	236	143.8	12
2	-153	175	49	235	138.7	-145	135	17	203	132.5	24	17	-156	165	-17	233	136.0	17
3	-155	175	50	236	138.3	-148	129	18	202	130.4	25	18	-162	159	-16	233	134.0	18
4	-153	176	50	234	138.9	-146	128	18	200	130.8	27	18	-160	159	-15	232	134.2	18
5	-150	176	51	233	139.5	-138	132	17	197	133.3	27	18	-152	161	-15	229	136.1	19

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	18	15	6	4	5.6	39	15	12	22	10.1	32	13	7	5	8.4
2	33	18	4	3	9.1	11	39	15	16	10.7	22	45	10	10	12.6
3	12	6	4	7	2.6	15	44	18	23	12.1	24	52	12	15	13.8
4	19	19	5	3	6.5	30	39	16	9	14.7	32	43	9	10	13.5
5	15	9	5	5	4.3	47	42	15	20	19.6	54	50	11	11	20.4

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	18	15	6	4	5.6	39	15	12	22	10.1	32	13	7	5	8.4
2	29	20	5	4	8.5	31	35	13	19	12.7	31	40	9	9	12.8
3	24	17	5	5	7.1	27	38	14	19	12.6	30	44	10	11	13.1
4	23	17	5	5	6.9	28	37	15	17	12.9	30	43	9	11	12.9
5	23	16	5	8	6.5	35	38	14	18	14.9	38	43	9	12	14.8

HEIGHT = 43.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
 START TIME 9:20:0  
 END TIME 9:25:0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-192	178	47	263	132.8	-169	168	26	240	134.6	13	10	-178	197	-22	266	137.7	8
2	-196	180	46	267	132.4	-174	174	28	247	134.7	12	8	-181	202	-22	272	138.0	9
3	-175	200	45	267	138.7	-161	175	30	239	137.1	14	11	-172	208	-23	270	140.3	7
4	-168	183	49	249	137.2	-148	176	27	231	139.7	11	5	-159	198	-23	254	141.0	7
5	-156	177	55	237	138.3	-114	145	15	190	141.2	26	15	-139	173	-14	231	140.3	22

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-192	178	47	263	132.8	-169	168	26	240	134.6	13	10	-178	197	-22	266	137.7	8	
2	-194	179	47	265	132.6	-172	171	27	243	134.7	12	9	-179	199	-22	269	137.8	8	
3	-188	186	46	264	134.6	-168	172	28	242	135.5	13	10	-177	202	-22	269	138.7	8	
4	-183	185	47	262	135.2	-163	173	28	239	136.5	12	8	-172	201	-22	266	139.2	8	
5	-178	184	48	257	135.9	-153	167	25	229	137.5	15	10	-166	195	-21	259	139.5	11	

ONE MINUTE STANDARD DEVIATIONS

PEAKS			I. FOURIER COEFFICIENTS						I SINE WAVE FIT					
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH		
1	6	6	3	3	1.7	15	17	13	4.6	3	3	1	1.8	
2	8	9	2	2	2.5	7	11	4	7	3	4	1	1.0	
3	19	14	4	6	4.8	8	15	4	11	5	5	1	1.0	
4	9	10	4	5	3.0	6	3	3	5	4	6	1	1.2	
5	11	10	3	4	3.4	35	44	13	28	40	54	10	17.3	

CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT							
MIN	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH	SP
1	6	6	3	3	1.7	15	17	7	13	4.6	3	3	1	1	1.8
2	7	7	2	3	2.1	12	14	6	11	3.5	3	4	1	3	1.9
3	15	14	3	4	4.3	11	14	5	11	3.5	5	6	1	4	1.5
4	16	13	4	8	4.1	14	12	5	11	3.6	9	6	1	8	1.7
5	18	13	5	13	4.1	28	24	9	25	7.6	23	26	5	16	7.4

HEIGHT = 2A.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
 START TIME 9:25:0  
 END TIME 9:30:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH			
1	-122	166	51	208	143.3	-120	129	20	177	137.4	23	22	-132	166	-24	213	141.3	8
2	-129	152	49	201	139.5	-101	111	13	165	134.6	32	29	-116	137	-14	203	137.1	18
3	-107	146	51	195	144.0	-87	116	16	175	138.6	24	21	-101	127	-14	202	138.8	22
4	-135	133	50	191	134.2	-138	30	3	148	100.4	40	40	-172	21	-2	188	97.0	29
5	-136	128	52	188	133.0	-149	75	12	169	115.8	27	21	-156	98	-16	190	121.5	17

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-122	164	51	208	143.3	-120	129	20	177	137.4	23	22	-132	166	-24	213	141.3	8
2	-126	158	50	204	141.1	-109	119	16	170	135.8	28	26	-123	149	-18	207	138.9	14
3	-120	154	50	201	142.0	-101	118	16	172	136.7	27	24	-115	142	-17	206	138.8	17
4	-124	149	50	199	140.1	-110	96	13	166	127.7	30	28	-130	112	-13	201	128.4	20
5	-126	144	51	196	138.5	-119	91	12	167	125.0	29	27	-135	109	-14	199	126.8	19

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	19	21	5	6	7.6	27	12	12	26	4.4	10	12	1	3	4.0
2	18	12	7	6	5.9	37	65	14	21	28.8	46	90	13	8	31.5
3	72	33	9	5	23.7	85	76	15	38	37.3	98	90	13	21	40.0
4	8	12	2	3	4.3	5	50	8	20	17.2	20	74	11	7	23.6
5	12	14	1	2	5.5	4	29	7	13	9.4	16	45	10	5	14.8

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	19	21	5	6	7.6	27	12	12	26	4.4	10	12	1	3	4.0
2	18	17	6	7	6.6	33	49	13	23	21.4	36	69	11	8	23.5
3	43	23	7	8	14.0	54	57	13	28	26.6	61	74	11	13	28.8
4	37	23	6	8	12.7	49	67	13	28	29.1	59	90	13	14	32.8
5	34	23	5	8	11.7	46	61	12	25	26.3	53	82	12	14	29.6

WEIGHT = 43. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:25:0 END TIME 9:30:0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	N	W	SP	TH	U	V	W	SP	TH	20	30	U	V	W	SP	TH	
1	-155	160	51	224	135.8	-111	149	22	187	143.0	16	6	-131	180	224	143.8	13	SP	
2	-128	165	56	210	141.9	-105	127	18	167	139.9	13	11	-135	159	-22	210	139.4	13	
3	-129	146	53	197	138.3	-97	124	17	158	141.6	14	4	-118	159	-20	199	143.1	16	
4	-111	136	47	180	140.4	-63	103	7	123	148.4	18	12	-76	158	-10	180	153.8	27	
5	-122	104	43	175	131.8	-78	71	9	108	131.5	18	16	-124	113	-12	174	131.8	27	

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	N	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-155	160	51	224	135.8	-111	149	22	187	143.0	16	6	-131	180	-21	224	143.8	13
2	-143	162	53	218	138.6	-108	139	20	178	141.6	15	9	-133	170	-21	217	141.8	13
3	-138	157	53	211	138.5	-104	134	19	171	141.6	14	7	-127	166	-21	211	142.2	14
4	-132	152	52	204	139.0	-95	127	16	160	143.2	15	8	-116	164	-18	204	144.9	17
5	-130	143	50	198	137.6	-92	116	15	150	141.0	16	10	-117	155	-17	198	142.4	19

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN		U	V	W	TH	U	V	W	TH	20	30	U	V	W	SP
1	15	16	3	9	5.1	11	11	4	9	3.9	13	9	3	5	4.0
2	14	8	5	4	4.4	10	23	9	10	8.1	15	20	7	8	6.6
3	21	20	5	6	8.3	10	12	3	11	4.0	15	14	4	7	5.5
4	31	28	6	4	13.3	21	12	2	7	10.7	33	23	3	3	12.9
5	43	38	8	9	25.2	14	21	2	5	13.1	33	37	5	7	16.2

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN		U	V	W	TH	U	V	W	TH	20	30	U	V	W	SP
1	15	16	3	9	5.1	11	11	4	9	3.9	13	9	3	5	4.0
2	20	13	5	10	5.6	11	20	7	14	6.1	13	18	5	9	5.6
3	21	17	5	13	6.4	12	19	6	16	5.4	15	17	5	12	5.5
4	25	21	6	18	8.2	21	22	7	25	7.3	30	19	6	17	9.0
5	34	31	7	20	12.9	22	31	7	31	9.6	30	30	7	20	11.6

HEIGHT = 28. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:30: 0 END TIME 9:35: 0

ONE MINUTE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W			SPEED
1	-156	114	53	194	125.9	-155	101	21	186	123.0	17	9	-152	130	-23	201	130.4	12
2	-165	88	50	190	117.9	-152	97	25	182	122.4	13	8	-161	111	-21	197	124.3	13
3	-161	57	42	189	107.3	-153	70	18	173	113.7	17	14	-171	74	-15	193	113.0	17
4	-177	81	48	194	114.6	-160	85	22	183	117.6	11	12	-174	99	-21	202	119.4	12
5	-179	100	48	207	119.1	-155	67	20	180	110.2	24	22	-175	79	-16	209	112.0	15

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				SP					
	U	V	A	SPEED	TH	U	V	W	SPEED	TH	2D	3D		U	V	W	SPEED	TH
1	-156	114	53	194	125.9	-155	101	21	186	123.0	17	9	-152	130	-23	201	130.4	12
2	-161	100	52	192	121.6	-153	99	23	184	122.6	15	9	-157	120	-22	199	127.1	13
3	-161	86	49	191	117.1	-153	90	21	180	119.8	16	10	-161	105	-20	197	122.7	14
4	-165	85	49	192	116.4	-155	88	22	181	119.2	14	11	-165	104	-20	198	121.8	14
5	-168	88	48	195	116.9	-155	84	21	181	117.5	16	13	-167	99	-19	200	120.0	14

B-5

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W		SPEED	
1	11	15	2	5	5.3	3	8	3	4	2.3	4	6	1	3	1.8
2	14	30	6	3	10.0	13	16	7	9	4.1	8	19	4	3	5.9
3	13	85	6	6	28.0	11	43	11	13	14.5	11	49	8	5	15.1
4	9	20	3	5	6.3	13	22	6	13	6.9	6	17	2	5	5.0
5	8	14	3	2	4.5	22	65	14	23	24.0	5	89	13	8	26.4

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W		SPEED	
1	11	15	2	5	5.3	3	8	3	4	2.3	4	6	1	3	1.8
2	13	27	4	5	8.9	10	13	6	7	4.6	8	17	3	3	5.4
3	13	54	7	5	17.8	16	28	8	10	9.5	11	36	6	5	11.3
4	14	47	6	5	15.5	11	27	7	11	8.8	11	32	5	5	10.0
5	14	43	5	8	14.0	13	36	9	13	13.0	11	47	7	7	14.4

HEIGHT = 43.

VAD OTIS2

TIME IN GMT CT VAD

9/16/76

OTIS AIRFORCE

HD 90.

START TIME 9:30:0  
END TIME 9:35:0

# ONE MINUTE MEANS

MIN	PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT					SP		
	U	V	W	SPEED	TH	I	U	V	SPEED	-H	2D	3D	U	V	W		SPEED	TH
1	-114	119	31	172	136.2	-90	9	9	95	94.7	45	26	-167	24	2	174	98.5	33
2	-151	38	23	175	102.0	-85	17	8	98	98.5	31	26	-147	31	-3	168	101.8	25
3	-158	74	32	179	115.5	-84	34	7	103	110.7	24	17	-139	65	-7	173	113.8	26
4	-175	47	40	190	110.4	-86	26	5	104	103.5	27	27	-146	36	-4	172	103.2	27
5	-154	106	27	192	124.2	-101	31	5	110	106.9	16	14	-162	48	-7	175	106.8	27

# CUMULATIVE MEANS

MIN	PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT								
	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	SP	
1	-114	119	31	172	136.2	-90	9	9	9	95	94.7	45	26	-167	24	2	174	98.5	33
2	-131	81	28	174	120.4	-88	12	8	8	96	96.5	38	26	-158	27	0	171	100.0	29
3	-140	79	29	175	118.9	-87	19	8	8	98	100.9	34	23	-152	39	-2	172	104.4	28
4	-148	76	32	179	116.9	-87	21	7	7	100	101.6	32	24	-150	38	-3	172	104.1	28
5	-149	82	31	182	118.3	-89	23	7	7	102	102.6	29	22	-153	40	-4	172	104.6	28

# ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS										I, FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED					
1	40	35	5	9	17.5	4	28	2	5	16.9	14	42	10											
2	23	85	2	4	30.9	11	48	4	10	29.7	16	77	10											
3	25	31	10	9	12.5	16	48	3	6	30.1	27	82	8											
4	7	33	13	10	10.0	13	54	5	10	32.7	22	88	14											
5	27	37	20	16	13.2	10	27	2	6	14.6	22	38	6											

# CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	#	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	40	35	5	9	17.5	4	28	2	5	16.9	14	42	10	8	14.6
2	37	73	6	7	29.4	8	37	3	7	22.7	18	58	10	8	20.7
3	35	62	7	8	25.0	11	41	3	7	25.3	22	67	10	7	24.0
4	34	56	10	11	22.5	11	43	4	8	26.5	22	70	11	7	25.3
5	33	54	12	13	21.0	12	40	4	9	24.6	22	65	10	9	23.4

HEIGHT = 2R. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:35:0 END TIME 9:40:0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										I				SINE WAVE FIT				SP
	U	V	W	R	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH				
1	-175	110	44	44	208	122.1	-166	108	24	198	122.9	5	7	-172	122	-21	212	125.2	9			
2	-177	98	44	44	205	118.9	-156	69	22	180	111.2	20	22	-175	83	-16	209	113.6	14			
3	-170	111	45	45	204	122.9	-163	100	27	192	121.4	10	11	-168	119	-24	207	125.1	9			
4	-185	69	47	47	199	110.4	-150	108	13	186	125.4	23	15	-166	118	-16	205	125.1	18			
5	-186	70	50	50	200	110.6	-150	112	13	188	126.5	24	13	-166	119	-16	205	125.5	18			

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS								SINE WAVE FIT				SP		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W		SPEED	TH
1	-175	110	44	208	122.1	-16.6	108	24	198	122.9	5	7	-172	122	-21	212	125.2	9
2	-176	104	44	206	120.4	-16.1	87	23	189	116.6	13	15	-173	101	-18	210	118.9	12
3	-174	106	44	205	121.2	-16.1	91	24	190	118.1	12	14	-172	107	-20	209	120.9	11
4	-177	97	45	204	118.6	-15.9	95	22	189	119.9	15	14	-171	109	-19	208	121.9	13
5	-178	92	46	203	117.0	-15.7	98	20	189	121.1	17	14	-170	111	-19	208	122.6	14

B 17

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT				TH
	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH		
1	3	7	3	2	2.0	2	1	0	.2	1	3	1	1	.6				
2	11	22	4	3	6.9	20	13	21	21.9	7	84	11	6	24.8				
3	8	9	5	2	3.2	4	14	3	5	4.0	3	7	2	3	1.9			
4	8	19	2	2	5.8	4	11	3	6	3.0	5	10	3	2	3.0			
5	7	19	3	2	5.6	4	9	1	2	2.7	5	8	1	1	2.5			

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT				TH
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH				
1	3	7	3	2	2.0	2	1	0	2	.2	1	3	1	1	.6			
2	4	18	3	3	5.3	15	46	9	18	16.6	5	63	8	4	18.6			
3	4	15	4	3	4.8	13	39	8	15	13.9	5	52	7	4	15.5			
4	9	23	4	4	6.8	12	35	8	13	12.6	5	46	7	4	13.6			
5	9	24	4	4	7.3	11	32	8	12	11.6	6	41	6	4	12.3			

START TIME 9:35: 0  
END TIME 9:40: 0

HD 90.

OTIS AIRFORCE

9/16/76

VAD

TIME

VAN OTIS2

HEIGHT = 43.

## ONE MINUTE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT					
	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP	
1	-15.9	5.6	11	175	109.8	-9.0	37	2	103	114.2	33	29	-139	70	-2	143
2	-14.7	4.6	55	202	109.7	-10.4	23	5	110	102.2	29	15	-173	37	-9	178
3	-17.4	11.3	47	211	122.5	-12.1	48	9	141	116.2	14	9	-173	11.4	-20	209
4	-19.4	4.6	54	202	103.2	-11.4	21	3	122	95.1	18	18	-183	21	-14	191
5	-19.0	5.4	57	202	104.1	-11.5	28	7	124	104.4	21	26	-123	41	-11	190

CUMULATIVE MEANS

LINE	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V			W	SPEED
1	-15.9	5.6	11	175	109.8	-9.0	37	2	103	114.2	33	29	-139	70	-2	163
2	-17.2	41	31	187	109.8	-9.8	31	4	106	108.6	31	22	-154	55	-5	170
3	-17.3	80	37	195	114.2	-10.6	44	6	118	112.3	25	18	-161	76	-10	184
4	-17.8	72	41	197	111.7	-10.9	36	5	119	108.4	23	18	-166	64	-11	185
5	-18.0	68	44	198	110.6	-10.4	35	5	120	107.6	23	19	-158	60	-11	186

### ONE MINUTE STANDARD DEVIATIONS

MTH	PEAKS			FOURIER COEFFICIENTS						SINE WAVE FIT						TH
	U	V	W	TH	U	V	W	SPEED	TH	U	V	W	SPEED			
1	31	37	19	16.0	2R	22	2	15	20.3	33	38	10	7	18.1		
2	27	27	14	7.4	17	8	2	18	5.8	15	19	5	16	5.7		
3	27	23	6	6.4	7	11	2	5	3.1	9	14	2	3	4.3		
4	11	3A	6	10.8	5	27	2	5	12.8	5	4R	4	12.8	14.6		
5	21	3R	7	12.5	61	79	R	37	54.2	96	11R	10	12	55.4		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS				I, SINE WAVE FIT				
WAVELENGTH	U	V	#	TH	U	V	#	TH	U	V	#	TH
1	31	37	19	13	28	22	2	15	33	38	10	7
2	27	32	28	18	24	18	2	16	31	35	8	14
3	22	38	24	12	23	24	3	21	27	41	10	22
4	22	40	22	17	21	28	3	19	25	47	9	20
5	22	39	21	15	32	41	4	23	48	64	19	26

WEIGHT = 43.

VAD OTIS2

TIME IN GMT CT VAD

9/16/76

OTIS AIRFORCE

MD 90.

START TIME 9:40:0  
END TIME 9:45:0

# ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	K	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		U	V	W	SPEED	TH	SP				
1	-171	29	29	185	96.6	-30	42	-3	98	137.1	26	27	-57	83	-7	171	137.8	26											
2	-132	90	15	171	122.9	3	66	-3	96	160.5	34	21	9	115	-7	168	162.1	26											
3	-103	-37	34	133	67.7	-7	94	-6	101	175.2	52	15	-10	148	-2	155	174.8	18											
4	-81	54	25	130	121.1	-72	-31	9	99	67.6	54	23	-87	-8	-27	113	94.7	19											
5	-175	24	44	193	96.3	-93	-30	11	112	69.9	41	24	-149	-12	-10	167	81.2	31											

# CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	K	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		U	V	W	SPEED	TH	SP				
1	-171	29	29	185	96.6	-30	42	-3	98	137.1	26	27	-57	83	-7	171	137.8	26											
2	-154	55	23	179	107.9	-16	52	-3	97	147.1	30	24	-28	97	-7	170	148.2	26											
3	-139	27	26	165	95.8	-13	65	-4	98	155.5	36	21	-23	112	-6	165	156.8	24											
4	-124	34	26	156	102.4	-28	40	0	98	132.7	41	22	-39	81	-11	152	140.7	23											
5	-133	33	29	163	101.3	-40	27	1	101	121.3	41	22	-59	64	-11	154	129.9	24											

# ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	K	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH			U	V	W	SPEED	TH					
1	33	65	30	29	23.2	50	74	6	12	64.3	90	118	6	18	61.6														
2	24	62	34	10	22.9	26	73	9	6	65.9	45	125	4	7	65.9														
3	38	77	32	27	37.2	38	8	4	3	22.9	53	14	12	18	19.1														
4	62	71	35	24	46.5	14	61	5	6	39.2	49	77	25	52	53.8														
5	34	87	14	45	23.9	20	57	3	16	29.9	40	82	10	48	25.4														

# CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	K	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH			U	V	W	SPEED	TH					
1	33	65	30	29	23.2	50	74	6	12	64.3	90	118	6	18	61.6														
2	35	69	31	23	26.0	44	72	7	10	63.6	79	117	5	14	62.2														
3	42	82	31	32	34.4	41	63	6	9	55.5	72	100	8	16	54.0														
4	53	79	31	33	38.6	45	75	8	8	64.4	72	108	17	37	59.8														
5	54	79	30	38	36.1	48	76	9	11	64.1	79	109	16	39	59.5														

HEIGHT # 28. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE MD 90. START TIME 9:40:0 END TIME 9:45:0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-170	99	45	198	120.2	-166	99	22	194	120.7	4	-171	110	204	122.6
2	-175	87	47	206	115.0	-123	100	12	161	129.6	25	19	-162	135	214
3	-168	59	34	188	109.5	-110	48	5	127	112.5	23	20	-160	80	129.8
4	-162	54	31	177	108.2	-111	16	8	120	98.4	23	22	-163	26	115.6
5	-151	86	59	211	114.0	-156	63	21	175	112.3	19	7	-181	97	98.6
													-21	211	117.7
															20

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-170	99	45	198	120.2	-166	99	22	194	120.7	4	-171	110	204	122.6
2	-177	93	46	202	117.6	-144	100	17	178	125.2	15	12	-166	122	209
3	-174	80	42	197	114.6	-132	81	13	159	120.5	18	15	-164	107	126.2
4	-171	74	39	192	113.1	-127	65	11	150	115.2	19	17	-164	87	122.3
5	-175	76	43	196	113.3	-132	65	13	155	114.6	19	15	-167	89	116.6
													-14	199	116.8
															23

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	6	6	3	2	2.3	5	6	2	4	2.1	5	7	1	3	2.1
2	11	20	14	9	6.0	32	18	11	23	10.7	30	26	11	6	10.6
3	25	59	14	8	19.7	14	42	5	13	19.5	20	60	6	9	19.6
4	16	46	10	10	15.6	14	43	8	6	22.2	18	76	6	7	25.3
5	12	15	8	17	2.7	38	40	11	22	17.6	28	46	10	16	14.3

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	6	6	3	2	2.3	5	6	2	4	2.1	5	7	1	3	2.1
2	11	16	10	7	5.1	31	13	9	23	8.7	21	22	8	7	8.2
3	17	40	13	10	12.7	31	37	10	32	14.6	20	44	8	13	14.0
4	14	42	13	13	13.4	29	47	9	33	18.8	19	62	8	15	19.7
5	18	38	14	15	12.1	32	45	10	37	18.4	22	59	9	16	18.6

WEIGHT # 2F. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE MD 90. START TIME 9:45:0 END TIME 9:50:0

ONE MINUTE MEANS

MIN	U	V	PEAKS			FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
			V	R	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		
1	-140	87	46	210	114.4	-188	71	20	203	110.5	10	8	-191	102	-21	218	117.8	17	
2	-142	65	45	203	108.8	-170	19	17	178	94.9	20	19	-191	36	-14	206	99.7	22	
3	-141	39	43	191	102.0	-141	34	9	163	102.5	28	19	-163	49	-7	192	105.3	25	
4	-149	43	41	185	109.8	-135	32	11	159	99.1	29	22	-163	39	-7	192	100.5	22	
5	-147	14	44	158	94.8	-148	13	15	151	95.1	23	15	-168	30	-14	173	99.8	21	

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					SP
	U	V	R	A	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	
1	-190	87	46	210	114.4	-188	71	20	203	110.5	10	8	-191	102	-21	218	117.8	17	
2	-189	77	46	207	111.8	-180	47	18	191	103.3	15	13	-191	71	-18	212	109.4	19	
3	-186	64	45	201	108.4	-166	42	15	181	103.1	19	15	-181	63	-14	205	108.0	21	
4	-182	63	44	198	108.7	-159	40	14	176	102.1	22	17	-177	58	-13	202	106.3	21	
5	-176	54	44	190	106.1	-157	35	14	171	100.8	22	17	-175	53	-13	197	105.1	21	

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS						SINE WAVE FIT				TH	
	U	V	R	SPEED	TH	U	V	W	SPEED	TH	U	V	W		SPEED
1	6	14	3	6	3.8	3	19	2	6	5.1	4	14	2	7	3.4
2	13	37	6	7	11.0	23	48	10	20	17.0	11	71	11	7	20.8
3	5	45	6	4	13.5	41	70	16	18	31.7	37	89	13	11	31.4
4	6	40	10	11	12.2	32	78	10	16	34.1	30	98	11	14	33.3
5	10	58	3	5	21.8	8	22	5	7	8.7	5	27	3	8	8.7

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS						I SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	6	14	3	6	3.8	3	19	2	6	5.1	4	14	2	7	3.4
2	9	28	4	7	8.1	18	43	7	19	14.1	8	58	8	9	16.6
3	9	38	5	10	11.1	33	52	11	23	21.0	26	69	11	14	22.1
4	11	38	6	12	11.1	35	58	11	23	23.9	27	75	11	15	24.5
5	18	44	6	19	14.4	32	54	10	23	21.9	25	69	10	18	22.5

HEIGHT = 43. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:45:0 END TIME 9:50:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-182	90	44	208	116.7	-112	4	125	91.3	29	21	-179	20	-5	202	94.7	31	
2	-184	84	44	213	113.2	-135	15	13	155	90.8	24	20	-180	22	-7	211	93.8	27
3	-194	66	40	209	108.5	-145	65	19	180	111.7	12	11	-192	88	-16	214	114.2	18
4	-178	102	37	207	119.6	-153	21	12	168	95.0	18	18	-188	31	-12	207	97.5	26
5	-142	43	12	167	103.9	-118	-21	16	123	78.6	23	16	-163	-27	-10	171	40.2	26

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT											
MIN		V		W		SPEED		TH		U		V		W		SPEED		TH		U		V		W		SPEED		TH		SP	
1	-182	90	44	208	116.7	-112	4	125	91.3	29	21	-179	20	-5	202	94.7	31														
2	-189	87	44	211	114.8	-124	10	11	141	91.1	26	21	-180	21	-6	206	94.2	29													
3	-190	80	43	210	112.8	-137	27	13	153	97.6	22	18	-184	42	-9	209	100.5	25													
4	-187	85	42	210	114.5	-141	26	13	157	96.9	21	18	-185	39	-10	208	99.8	26													
5	-178	76	35	200	112.1	-136	15	14	149	92.9	21	17	-180	25	-10	200	95.5	26													

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH										
1	34	33	12	14	13.3	27	53	14	28.9	32	93	13	19	29.0																
2	6	19	5	7	5.2	29	79	12	28	31.6	25	113	16	18	33.1															
3	11	41	6	3	11.6	16	28	7	12	9.5	7	30	6	4	8.2															
4	16	21	12	15	6.0	27	68	5	22	25.7	23	85	9	14	25.6															
5	21	78	10	7	30.3	15	22	5	9	12.1	13	43	6	6	15.1															

CUMULATIVE STANDARD DEVIATIONS

PEAKS	I. FOURIER COEFFICIENTS										I SINE WAVE FIT									
	U					V					W					TH				
	U	V	A	SPEED	TH	U	V	A	SPEED	TH	U	V	A	SPEED	TH	U	V	W	SPEED	TH
1	34	33	12	14	13.3	27	53	14	28.9	32	93	13	19	29.0						
2	23	26	9	11	9.5	29	66	10	27	29.1	27	100	14	18	30.0					
3	20	32	8	9	10.3	32	62	10	30	26.2	23	89	13	16	26.7					
4	20	31	9	10	9.8	31	62	9	28	25.6	23	86	12	15	25.9					
5	27	47	15	20	14.5	30	59	8	29	24.4	23	83	11	21	25.1					



WEIGHT = 42. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:50: 0  
END TIME 9:55: 0

ONE MINUTE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP	
1	-147	74	3	167	117.0	-107	-36	22	115	71.2	35	25	-153	71.0
2	-130	32	10	155	99.5	-89	-63	23	112	54.8	40	14	-130	57.6
3	-136	52	9	163	108.4	-91	-56	24	113	57.8	39	27	-144	59.4
4	-175	77	41	194	113.8	-135	44	12	170	110.1	20	15	-163	110.0
5	-193	66	46	205	108.7	-171	81	25	191	115.3	14	11	-191	118.3

CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT			
	V	U	W	TH	U	V	W	TH	U	V	W	TH	SP	
1	-147	74	3	167	117.0	-107	-36	22	115	71.2	35	25	-153	71.0
2	-138	54	7	161	113	-94	-49	23	113	63.0	38	21	-141	64.3
3	-138	53	8	162	113	-94	-52	23	113	61.1	38	23	-142	62.5
4	-147	59	16	170	109.6	-105	-24	20	127	72.8	34	21	-147	73.9
5	-164	40	22	17	109.5	-118	-3	21	139	81.0	30	19	-156	82.5

ONE MINUTE STANDARD DEVIATIONS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH		
1	5	17	4	4.0	5	11	2	5.8	4	18	2	6.6		
2	25	82	14	34.8	13	19	3	11.5	18	31	11	11.2		
3	17	76	9	29.7	23	25	4	17.7	33	41	11	18		
4	19	21	10	6.8	42	81	9	35.6	28	106	12	14		
5	6	14	3	4.2	11	11	6	3.1	7	10	4	3.0		

CUMULATIVE STANDARD DEVIATIONS

MI	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	5	17	4	4	6.0	5	11	1	2	5.8	4	14	2	4	6.6
2	19	41	10	12	25.5	14	20	2	4	12.2	17	30	7	13	11.2
3	18	45	10	10	26.3	17	22	3	3	14.2	23	34	9	16	13.1
4	24	58	18	18	23.1	30	66	7	28	29.5	25	85	9	23	28.3
5	29	52	20	22	20.7	38	73	7	36	31.5	29	93	10	27	30.9

HEIGHT = 28. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HU 90. START TIME 9:55: 0 END TIME 10: 0: 0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	#	SPEED	TH	U	V	#	SPEED	TH	U	V			#	SPEED		
1	-141	-3	46	156	87.0	-97	9	15	140	96.4	20	22	-112	18	-11	171	101.5	24
2	-138	-42	51	165	71.5	-123	-10	13	152	77.3	28	23	-143	-16	-9	183	79.9	24
3	-145	19	55	189	95.5	-140	12	15	166	87.2	23	20	-159	12	-12	193	89.6	21
4	-161	71	20	184	112.3	-126	-23	9	147	76.4	29	22	-144	-26	-6	175	78.3	24
5	-124	-37	41	161	71.3	-130	-7	13	144	86.1	30	23	-159	-16	-7	175	84.6	26

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	#	SPEED	TH	U	V	#	SPEED	TH	2D	3D			U	V	#	SPEED
1	-141	-3	46	156	87.0	-97	9	15	140	96.4	20	22	-112	18	-11	171	101.5	24
2	-139	-24	49	161	78.6	-111	-1	14	146	86.1	24	22	-129	0	-10	177	89.8	24
3	-152	-12	50	169	83.3	-119	2	14	152	86.4	24	22	-137	3	-11	182	89.8	24
4	-154	8	43	173	90.6	-121	-3	13	151	83.9	25	22	-139	-4	-9	180	86.9	24
5	-142	-1	42	170	86.2	-123	-4	13	149	84.4	26	22	-143	-6	-9	179	86.4	24

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			SINE WAVE FIT			TH					
	U	V	#	TH	U	V	#	SPEED	TH		U	V	#	SPEED	TH
1	29	45	3	5	27.7	78	77	12	15	57.3	92	106	13	2	57.1
2	37	77	4	7	30.8	63	74	12	24	42.3	59	105	15	6	41.9
3	26	29	9	28	8.2	62	78	15	24	41.0	58	106	15	8	40.6
4	10	56	22	18	17.8	44	67	12	16	33.9	41	96	14	5	36.4
5	41	93	15	14	38.1	17	61	10	10	25.9	18	75	6	6	26.2

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS					SINE WAVE FIT					TH	
	U	V	#	SPEED	TH	U	V	#	SPEED	TH	U	V	W		SPEED
1	29	65	3	5	27.7	78	77	12	15	57.3	92	106	13	2	57.1
2	32	71	5	8	29.3	68	73	12	21	48.6	74	103	13	7	48.6
3	37	65	6	20	26.1	66	72	12	23	45.4	70	101	14	10	45.4
4	32	72	18	20	27.2	61	70	12	21	42.4	63	98	14	9	42.8
5	36	78	17	19	30.4	54	67	11	19	38.9	56	92	12	9	39.3

HEIGHT = 43. VAD OTISZ TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 9:55:0 END TIME 10:01:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-189	60	43	202	107.5	-182	50	17	192	105.1	13	10	-195	70	-16	209	109.5	20
2	-187	37	42	193	101.0	-167	27	20	175	98.6	18	15	-190	37	-14	202	100.1	20
3	-178	53	42	195	105.9	-178	45	20	185	103.9	9	9	-189	66	-19	202	109.0	22
4	-189	54	46	201	105.7	-176	41	20	184	103.0	13	10	-199	61	-17	212	106.9	19
5	-188	52	47	208	104.9	-183	41	17	191	102.6	9	9	-205	56	-19	216	105.2	19

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS					SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-189	60	43	202	107.5	-182	50	17	192	105.1	13	10	-195	70	-16	209	109.5	20
2	-188	49	43	198	104.5	-175	39	18	184	102.1	15	12	-193	55	-15	206	105.2	20
3	-185	50	42	197	104.9	-176	41	19	185	102.7	13	11	-192	58	-16	205	106.4	21
4	-186	51	43	198	105.1	-176	41	19	184	102.7	13	11	-194	59	-16	207	106.5	20
5	-188	52	44	200	105.1	-177	41	19	186	102.7	13	11	-196	59	-17	208	106.3	20

ONE MINUTE STANDARD DEVIATIONS

PEAKS		I, FOURIER COEFFICIENTS				I SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	13	29	5	4	9.1	13	30	7	7	9.2	5	27	6	4	7.6
2	3	28	4	4	8.3	17	46	10	15	15.8	7	60	8	11	17.4
3	19	59	13	10	17.7	4	22	4	4	6.7	4	23	2	3	6.7
4	9	43	7	13	11.9	13	32	10	12	10.1	11	35	6	9	10.0
5	13	30	4	6	8.8	15	33	6	12	10.1	11	35	6	6	9.7

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS						SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	13	29	5	4	9.1	13	30	7	7	9.2	5	27	6	4	7.6
2	10	30	4	5	9.0	15	38	8	14	12.6	6	47	7	8	13.4
3	14	40	8	7	11.9	12	33	7	11	10.9	6	40	6	7	11.6
4	12	40	8	9	11.7	12	32	9	11	10.5	8	38	6	8	11.0
5	13	38	7	9	11.1	13	32	7	12	10.3	9	37	6	8	10.6

HEIGHT = 28. VAD OT152 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 10:51.0 END TIME 10:10:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP		
1	-130	-37	33	137	73.7	-108	-27	21	117	78.0	44	13	-138	-23	-10	146	78.6	14		
2	-119	-57	43	135	64.3	-117	-33	16	124	74.0	17	9	-130	-37	-17	137	74.0	11		
3	-122	-52	45	134	66.8	-113	-44	17	122	68.5	7	4	-127	-50	-19	138	68.2	11		
4	-122	-35	46	129	73.7	-94	-28	8	100	73.4	17	16	-123	-35	-16	130	73.9	13		
5	-105	-57	46	128	60.9	-71	-24	7	91	81.0	20	31	-106	-19	-16	128	82.6	15		

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP		
1	-130	-37	33	137	73.7	-108	-27	21	117	78.0	44	13	-138	-23	-10	146	78.6	14		
2	-124	-48	38	136	68.7	-113	-30	18	121	75.8	30	11	-133	-30	-14	141	76.1	12		
3	-123	-49	40	135	68.1	-113	-35	18	121	73.5	23	9	-131	-37	-15	140	73.6	12		
4	-123	-45	42	134	69.6	-108	-33	15	116	73.5	21	11	-129	-36	-16	137	73.7	12		
5	-120	-47	43	133	68.0	-101	-31	14	111	74.9	21	14	-125	-33	-16	136	75.4	13		

B-17

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	5	17	5	2	7.6	12	37	9	16	18.3	24	39	16	20	15.8		
2	12	23	6	2	11.1	6	16	6	6	7.6	4	15	3	4	6.2		
3	5	8	2	3	3.7	4	5	2	4	2.5	2	6	1	3	2.2		
4	4	16	3	3	7.1	7	14	5	9	7.9	4	17	5	3	7.9		
5	26	39	2	1	21.4	30	47	4	12	44.6	28	69	5	2	36.5		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	5	17	5	2	7.6	12	37	9	16	18.3	24	39	16	20	15.8		
2	11	22	7	2	10.5	10	27	8	12	13.1	16	28	11	14	11.4		
3	9	19	7	2	8.8	8	23	7	10	11.4	13	25	10	11	10.1		
4	8	19	6	4	8.6	12	21	7	13	10.4	12	23	8	11	9.4		
5	15	23	6	4	12.1	22	27	8	16	20.4	18	35	8	10	17.3		

```
START TIME 10: 5: 0
END TIME 10:10: 0
```

HD 90.

OTIS AIRFORCE

9216176

AD

TIME IN GMT

VAD

HEIGHT = 43.

### ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-171	6	31	175	91.2	-132	-17	1	135	82.1	49	38	-180	23	-18	184	97.0	9
2	-111	-68	38	132	58.6	7	19	0	71	152.5	27	73	20	33	3	119	162.1	11
3	-167	9	47	172	92.7	-73	9	0	85	105.9	46	41	-140	30	-18	161	109.6	15
4	-153	54	46	168	111.2	-64	32	1	88	121.9	26	50	-135	28	-19	162	110.1	18
5	-48	17	8	99	117.3	9	31	0	59	131.6	51	55	-74	-2	-112	127.0	111	11

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS						SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-171	6	31	175	91.2	-132	-17	1	135	82.1	49	38	-180	23	-18	184	97.0	9
2	-138	-34	35	152	73.4	-56	2	0	100	120.5	37	57	-70	29	-6	149	125.5	10
3	-149	-17	40	160	80.9	-62	5	0	94	114.8	41	51	-97	29	-11	153	123.6	12
4	-150	0	41	162	88.5	-63	12	1	93	116.6	37	51	-107	29	-13	156	120.2	13
5	-136	3	36	151	93.5	-51	15	0	87	119.2	39	51	-101	31	-12	148	121.4	14

### ONE MINUTE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS								I, SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	17	39	23	15	13.7	12	18	1	11	8.0	8	31	4	9	9.7
2	7	16	6	3	7.5	43	61	1	8	88.3	85	89	16	6	89.2
3	8	37	18	9	12.4	40	27	1	18	39.6	73	36	8	26	37.0
4	38	33	14	23	16.6	40	42	1	17	42.7	79	56	11	31	43.0
5	61	63	58	41	52.0	33	28	1	14	39.3	75	45	15	31	45.3

CUMULATIVE STANDARD DEVIATIONS

PEAKS			I, FOURIER COEFFICIENTS						I, SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	17	39	23	15	13.7	12	18	1	11	8.0	8	31	4	9	9.7
2	33	48	15	25	19.8	80	49	1	35	72.6	121	66	17	35	71.9
3	30	48	17	22	19.5	66	41	1	30	60.9	108	55	15	32	60.5
4	31	54	16	22	20.8	60	42	1	27	56.1	101	54	14	31	56.1
5	48	55	30	35	30.6	57	40	1	28	53.3	97	52	14	35	53.7

START TIME 10:10: 0  
END TIME 10:15: 0

VAD	OTIS2	TIME IN GMT	CT	VAD	9/16/76	OTIS AIRFORCE	HD 90.
-----	-------	-------------	----	-----	---------	---------------	--------

## ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS							I							SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH						
1	-102	-61	47	123	59.2	-69	-45	4	85	56.7	15	32	-107	-55	-18	124	62.1	11					
2	-95	-61	46	118	56.9	-52	-22	1	73	77.5	26	56	-94	-10	-11	120	86.3	16					
3	-80	-42	40	112	78.5	-28	-13	0	62	97.1	30	56	-52	-16	-8	107	99.2	13					
4	-73	-61	29	101	54.4	-7	24	0	53	147.0	49	53	-14	48	-2	107	149.6	13					
5	-68	-41	32	107	81.5	-54	-12	0	67	84.3	61	66	-94	-16	-1	108	80.0	14					

CUMULATIVE MEANS

PEAKS					FOURIER COEFFICIENTS					I SINE WAVE FIT								
HIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-102	-61	47	123	59.2	-69	-45	4	85	56.7	15	32	-107	-55	-18	124	62.1	11
2	-99	-61	47	121	58.2	-62	-35	3	79	66.3	20	43	-101	-34	-15	122	73.3	14
3	-92	-54	44	118	65.3	-50	-27	2	73	77.1	23	48	-84	-28	-13	117	82.4	13
4	-88	-56	41	114	62.8	-40	-15	1	68	93.2	29	49	-68	-10	-10	115	97.9	13
5	-85	-53	39	113	65.8	-42	-14	1	68	91.8	35	52	-72	-11	-9	114	95.0	13

### ONE MINUTE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	16	23	3	5	12.7	10	11	2	7	9.0	17	18	3	7	11.1
2	21	27	4	4	16.8	25	41	1	8	48.7	39	69	8	10	42.7
3	49	5	14	18	55.2	38	43	1	8	76.2	65	75	10	12	73.6
4	13	41	30	26	21.0	34	40	1	12	72.0	73	77	5	22	71.0
5	48	70	39	33	62.0	22	39	1	21	38.2	42	47	11	31	31.5

## CUMULATIVE STANDARD DEVIATIONS

[illegible]

HEIGHT = 43. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 101101 0  
END TIME 101151 0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP			
1	-38	7	-6	89	88.1	-30	36	0	51	134.9	84	79	-73	55	-9	97	126.0	11			
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-38	7	-6	89	88.1	-30	36	0	51	134.9	84	84	79	-73	55	-9	97	126.0	11
2	-38	7	-6	89	88.1	-30	36	0	51	134.9	84	84	79	-73	55	-9	97	126.0	11
3	-38	7	-6	89	88.1	-30	36	0	51	134.9	84	84	79	-73	55	-9	97	126.0	11
4	-38	7	-6	89	88.1	-30	36	0	51	134.9	84	84	79	-73	55	-9	97	126.0	11
5	-38	7	-6	89	88.1	-30	36	0	51	134.9	84	84	79	-73	55	-9	97	126.0	11

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	I,		I,				I				I						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	29	97	23	27	75.5	8	22	0	10	25.8	20	35	42	10	23.0		
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	29	97	23	27	75.5	8	22	0	10	25.8	20	35	12	10	23.0		
2	29	97	23	27	75.5	8	22	0	10	25.8	20	35	12	10	23.0		
3	29	97	23	27	75.5	8	22	0	10	25.8	20	35	12	10	23.0		
4	29	97	23	27	75.5	8	22	0	10	25.8	20	35	12	10	23.0		
5	29	97	23	27	75.5	8	22	0	10	25.8	20	35	12	10	23.0		

HEIGHT \* 28. VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HU 90. START TIME 10:15: 0  
END TIME 10:20: 0

ONE MINUTE MEANS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	-44	-44	20	99	65.9	-25	35	0	54	141.7	44	-36	59	1
2	-51	-39	24	125	82.5	-37	-14	0	69	83.1	52	-57	-34	0
3	-83	-84	70	119	44.5	12	50	9	51	193.8	39	24	25	8
4	-96	-100	48	140	44.0	-64	-50	1	86	52.9	23	38	-99	-71
5	-64	-31	16	108	82.4	-28	-1	0	62	106.3	49	57	-55	1
													-4	116
														106.0
														14

CUMULATIVE MEANS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	-84	-44	20	99	65.9	-25	35	0	54	141.7	44	-36	59	1
2	-58	-40	24	120	78.8	-35	-3	0	65	96.1	39	-52	-13	0
3	-61	-45	27	120	75.4	-30	2	1	64	105.9	39	-45	-4	0
4	-71	-60	33	125	66.4	-40	-12	1	70	90.8	35	-60	-23	-3
5	-69	-51	27	120	71.8	-36	-8	1	68	95.9	39	-58	-14	-3
														115
														95.5
														14

ONE MINUTE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	13	46	58	32	21.6	35	30	0	3	51.9	55	58	7	16
2	59	102	35	25	74.3	41	45	1	14	61.5	79	71	13	22
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	8	3	7	5	3.0	8	23	0	6	16.3	19	38	10	7
5	41	84	30	32	60.1	40	47	1	17	70.6	75	82	10	21
														70.3

CUMULATIVE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	13	46	58	32	21.6	35	30	0	3	51.9	55	58	7	16
2	53	90	37	27	65.2	38	46	0	14	62.0	72	77	11	24
3	51	86	38	25	62.4	39	47	3	14	66.1	72	79	11	24
4	46	76	33	23	54.0	37	47	2	16	60.9	66	75	12	22
5	43	77	32	27	55.1	37	46	2	16	62.9	67	77	11	21
														65.6

HEIGHT = 40.

VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HO 90.

START TIME 10:20: 0  
END TIME 10:25: 0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP											
1	-36	13	16	130	113.9	-40	-4	1	75	102.6	37	36	-61	-14	-6	127	98.7	14											
2	-97	-70	51	136	59.6	-44	-19	0	72	84.4	44	39	-75	-33	-10	130	89.4	13											
3	-111	-92	47	147	50.2	-53	-30	2	86	60.7	29	26	-87	-44	-14	142	81.2	15											
4	-133	-73	48	155	61.1	-74	-39	7	86	62.2	25	33	-121	-67	-15	143	59.8	15											
5	-132	-77	49	155	59.8	-61	-55	1	96	48.5	24	27	-112	-78	-18	140	54.7	14											

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
TH	J	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP											
1	-36	13	16	130	113.9	-40	-4	1	75	102.6	37	36	-61	-14	-6	127	98.7	14											
2	-64	-31	35	133	84.7	-42	-13	1	74	92.8	41	37	-68	-24	-8	129	93.7	13											
3	-82	-51	39	137	73.8	-46	-19	1	78	89.0	37	34	-74	-30	-10	133	89.7	14											
4	-86	-57	41	142	70.4	-53	-24	1	80	81.8	34	34	-87	-40	-11	135	81.7	14											
5	-103	-60	43	145	68.4	-55	-30	1	81	75.5	32	32	-92	-47	-12	136	76.6	14											

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT											
1	U	V	W	TH	U	V	W	TH	SP	U	V	W	TH	U	V	W	TH	SP	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP
1	61	123	45	23	78.6	40	59	1	18	70.2	63	103	10	18	72.2																
2	21	64	16	17	34.4	40	43	1	10	63.8	83	73	15	21	66.0																
3	13	19	6	8	8.3	45	42	2	11	63.4	74	84	9	6	61.9																
4	15	22	12	12	9.0	17	14	1	15	11.4	30	17	8	19	12.3																
5	11	14	8	7	7.9	9	20	1	10	13.8	20	19	6	13	10.4																

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
TH	U	V	W	TH	U	V	W	TH	SPEED	TH	U	V	W	TH	U	V	W	TH	SPEED	TH	U	V	W	TH	U	V	W	TH	SPEED
1	61	123	45	23	78.6	40	59	1	18	70.2	63	103	10	18	72.2														
2	53	102	37	19	62.9	38	47	1	13	63.2	72	85	13	19	66.1														
3	48	88	31	17	54.1	40	44	2	14	61.8	71	83	12	17	63.3														
4	47	77	27	14	46.5	37	42	2	14	54.1	65	73	11	18	55.7														
5	45	70	25	12	42.1	33	41	1	14	50.6	60	67	10	17	51.4														

HEIGHT = 2M.

VAD OTIS2

TIME IN GMT CT VAD

9/16/76

OTIS AIRFORCE

HD 90.

START TIME 10:35: 0  
END TIME 10:40: 0

# ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										I										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	MIN	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP							
1	-161	-53	44	171	71.6	-121	-71	18	142	59.2	12	13	-151	-72	-21	169	64.3	13	1	-157	-60	48	172	68.9	9	14	-165	-58	-23	176	70.3	14							
2	-157	-60	48	172	68.9	-125	-62	19	140	63.5	9	14	-165	-58	-23	176	70.3	14	2	-163	-48	46	173	73.4	9	16	-162	-52	-21	174	72.2	13							
3	-163	-48	46	173	73.4	-129	-57	16	144	65.9	9	16	-162	-52	-21	174	72.2	13	3	-158	-52	55	168	71.5	22	23	-126	-98	-18	167	51.9	21							
4	-158	-52	55	168	71.5	-98	-79	11	130	50.8	22	23	-126	-98	-18	167	51.9	21	4	-160	-48	60	172	73.0	35	16	-87	-56	-15	161	80.7	20							
5	-160	-48	60	172	73.0	-66	-51	6	122	74.6	35	16	-87	-56	-15	161	80.7	20	5																				

# CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP						
1	-161	-53	44	171	71.6	-121	-71	18	142	59.2	12	13	-151	-72	-21	169	64.3	13						
2	-159	-56	46	172	70.2	-123	-66	19	141	61.5	10	14	-158	-65	-22	173	67.5	14						
3	-160	-54	46	172	71.2	-125	-63	18	142	62.9	10	14	-159	-60	-22	173	69.0	14						
4	-160	-53	48	171	71.2	-118	-68	16	139	59.6	13	17	-150	-71	-21	171	64.4	16						
5	-160	-54	51	171	71.6	-108	-64	14	136	62.4	17	17	-138	-68	-20	170	67.4	16						

# ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										I SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH									
1	9	6	5	7	3.2	11	8	1	7	4.8	9	9	2	5	4.3														
2	14	31	6	3	11.1	5	5	4	4	2.2	8	10	2	5	3.9														
3	12	26	4	5	9.4	10	23	6	5	10.0	8	33	6	3	11.4														
4	13	17	11	7	6.8	22	21	4	10	12.6	30	38	5	3	16.8														
5	17	36	14	10	13.2	61	75	6	5	66.1	96	94	12	4	68.5														

# CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
IN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH									
1	9	8	5	7	3.2	11	8	1	7	4.8	9	9	2	5	4.3														
2	11	22	6	5	8.3	6	8	3	6	4.1	11	12	2	6	5.0														
3	11	23	5	5	8.5	9	14	4	5	6.6	10	21	3	5	7.6														
4	11	21	8	6	8.0	18	17	5	9	10.0	23	31	4	5	13.0														
5	12	24	10	7	8.9	36	34	6	11	24.6	51	47	7	7	30.6														

HEIGHT \* 43.  
VAD UT152 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
START TIME 10:35: 0  
END TIME 10:40: 0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-128	48	34	171	116.9	4	85	-1	121	155.1	66	43	1	94	1	163	186.7	17	
2	-104	-5	7	146	94.0	-4	35	0	116	124.4	66	43	9	27	8	120	189.7	9	
3	-114	-71	21	150	60.7	-14	43	0	110	131.6	64	34	-14	59	-5	126	158.2	13	
4	-101	27	7	136	110.3	-9	113	-1	114	174.9	75	57	-6	161	-11	180	215.1	5	
5	-64	30	-22	72	114.4	3	116	0	116	181.4	60	20	12	27	65	30	204.7	3	

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-128	48	34	171	116.9	4	85	-1	121	155.1	66	43	1	94	1	163	186.7	17	
2	-116	21	20	159	105.4	0	60	0	118	139.8	66	43	5	61	5	141	188.2	13	
3	-115	-12	21	156	88.9	-5	54	0	115	136.8	65	40	-1	60	1	136	177.2	13	
4	-117	-4	18	152	93.4	-6	64	0	115	144.7	67	43	-2	81	-1	145	185.0	11	
5	-110	-2	14	148	94.2	-5	64	0	115	146.2	67	42	-2	79	1	140	185.8	11	

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH		
1	90	73	39	37	44.7	18	92	1	10	70.6	67	154	54	84	104.4				
2	79	93	56	49	49.0	20	119	2	11	88.2	69	118	84	50	104.0				
3	25	72	26	28	28.8	43	99	2	9	77.8	91	100	45	63	69.0				
4	73	64	19	10	46.9	20	8	1	9	9.7	38	161	88	139	74.7				
5	U	U	U	U	.0	0	0	0	0	.0	0	0	0	0	.0				

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH		
1	90	73	39	37	44.7	18	92	1	10	70.6	67	154	54	84	104.4				
2	82	84	44	41	46.3	19	105	2	10	77.8	65	135	68	70	99.4				
3	66	90	41	36	45.6	30	100	2	10	75.7	74	121	59	66	88.6				
4	66	86	37	33	45.7	28	92	2	10	69.0	67	133	64	84	85.8				
5	65	84	42	36	44.9	27	91	2	10	67.9	66	131	64	86	84.1				

HEIGHT = 28. VAD 0152 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HU 90. START TIME 10:40: 0  
END TIME 10:45: 0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-157	-63	49	173	67.7	-17	8	0	119	122.0	56	22	-30	29	-6	171	129.2	24	
2	-136	-68	56	160	63.5	6	46	0	122	148.2	59	32	19	45	11	130	176.0	13	
3	-140	-35	51	168	78.0	-51	-22	1	109	88.3	52	24	-98	3	-20	179	94.9	17	
4	-112	-69	38	145	57.2	-21	74	-1	109	146.9	74	44	-47	98	-4	145	156.1	15	
5	-69	21	4	137	119.2	-17	46	0	117	130.4	80	58	-18	165	-58	179	156.2	12	

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-157	-63	49	173	67.7	-17	8	0	119	122.0	56	22	-30	29	-6	171	129.2	24	
2	-146	-66	53	166	65.4	-4	28	0	121	136.1	58	28	-3	37	3	149	154.4	18	
3	-140	-56	52	167	69.4	-19	12	0	117	121.0	56	27	-33	27	-4	158	135.6	18	
4	-136	-59	49	162	66.7	-20	27	0	115	127.2	60	31	-36	44	-4	155	140.5	17	
5	-122	-41	39	156	78.1	-19	31	0	115	127.9	65	37	-32	70	-16	160	144.0	16	

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	20	25	12	8	10.6	71	107	5	8	87.9	115	141	11	11	9	83.6			
2	18	48	8	4	19.0	48	112	4	11	82.3	92	98	38	31	23	62.6			
3	23	89	14	5	33.7	49	91	4	16	71.9	77	146	8	8	35	51			
4	38	53	19	20	26.0	18	84	2	15	59.5	59	100	35	51	107	52.5			
5	82	99	47	30	67.9	22	113	3	10	77.0	70	109	38	107	58	70.7			

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	20	25	12	8	10.6	71	107	5	8	87.9	115	141	11	11	9	83.6			
2	21	38	10	9	15.2	59	107	4	10	82.4	102	114	29	31	23	62.6			
3	21	58	11	8	22.5	59	103	4	13	80.5	103	122	27	32	37	75.6			
4	29	56	14	15	23.3	52	101	4	14	75.7	93	119	28	37	58	70.7			
5	52	74	31	21	42.4	46	102	4	13	74.7	88	126	38	58	70.7				

HEIGHT = 43. VAD OT152 TIME IN GMT CT VAD 9/16/76 OT15 AIRFORCE HU 90. START TIME 10:40:0 END TIME 10:45:0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5	-12	-43	9	138	70.5	-12	131	0	132	174.0	84	64	7	27	67	29	185.9	3	7	27	67	29	185.9	3	7	27	67	29	185.9

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5	-12	-43	9	138	70.5	-12	131	0	132	174.0	84	64	7	27	67	29	185.9	3	7	27	67	29	185.9	3	7	27	67	29	185.9

B-26

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5	21	13	15	11.5	11.5	13	11	1	9	5.9	15	17	11	19	26.3	19	26.3	19	11	19	26.3	19	26.3	19	11	19	26.3	19	26.3

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5	21	13	15	11.5	11.5	13	11	1	9	5.9	15	17	11	19	26.3	19	26.3	19	11	19	26.3	19	26.3	19	11	19	26.3	19	26.3

START TIME 10:45:0  
END TIME 10:50:0

HD 90.

OTIS AIRFORCE

9/16/76

CT VAD

TIME IN GMT

OTIS

VAD

HEIGHT = 28.

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS					SINE WAVE FIT					SP		
							U	V	W	SPEED	TH	2U	3D	U	V	W		SPEED	TH
1	-39	53	-16	144	148.3		-4	76	0	124	146.7	74	52	-9	50	22	145	173.5	11
2	-87	-12	20	142	89.5		-17	114	-1	120	171.0	95	68	-26	134	6	194	199.3	10
3	-127	0	4	139	89.9		-5	124	0	125	176.5	94	74	-5	109	19	184	209.6	7
4	-103	13	1	142	103.5		-13	129	-1	131	173.6	86	63	-5	47	55	74	229.9	8
5	-135	-41	32	146	71.9		-9	124	-1	127	174.0	91	74	-39	111	24	200	223.5	10

CUMULATIVE MEANS

PIES	PIES						FOURIER COEFFICIENTS						I						SINE WAVE FIT						SP
	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	20	30	U	V	W	SPEED	TH	I					
1	-39	53	-16	144	148.3		-4	76	0	124	146.7		74	52	-9	50	22	145	173.5		11				
2	-65	17	3	143	116.2		-11	97	0	121	160.0		85	61	-18	96	13	172	187.6		11				
3	-87	10	5	142	106.9		-9	108	0	123	165.8		88	66	-14	101	15	176	195.4		9				
4	-89	11	4	142	106.4		-10	111	0	124	167.0		88	65	-12	93	21	161	200.5		9				
5	-95	4	5	142	101.9		-9	113	0	124	167.9		88	66	-16	95	22	166	203.5		9				

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I <sub>0</sub>	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH	
	U	V	W	SPEED		TH	U	V	W		SPEED	TH	U	V		W
1	107	49	74	24	69.5		22	107	2	11	75.0	84	144	43	70	90.9
2	70	100	27	12	61.2		10	13	1	13	5.3	62	156	89	73	70.7
3	23	57	7	10	26.3		18	15	0	14	8.9	40	177	101	80	71.7
4	62	100	24	9	54.3		20	11	0	8	9.4	51	93	55	81	72.3
5	23	37	14	14	14.3		28	24	1	22	13.7	66	198	111	68	107.1

CUMULATIVE STANDARD DEVIATIONS

CUMULATIVE STANDARD DEVIATIONS																			
PEAKS					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									
					I, FOURIER COEFFICIENTS					SINE WAVE FIT									

HEIGHT = 28. VAD OT152 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90. START TIME 11:45: 0 END TIME 11:50: 0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS									I					SINE WAVE FIT		
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-35	0	7	145	110.5	-72	-28	10	129	84.5	33	21	-87	-27	-9	161	85.0	19	
2	-123	-73	54	154	58.5	-61	-22	9	136	92.6	25	14	-78	-20	-7	165	94.2	21	
3	-134	-93	44	166	55.1	-110	-63	19	145	62.8	23	21	-144	-67	-13	183	65.5	22	
4	-135	-56	39	181	68.9	-115	30	10	151	101.3	33	27	-140	39	-7	184	104.9	29	
5	-136	-74	47	159	61.6	-135	-77	19	157	60.0	8	6	-146	-84	-19	170	59.9	17	

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-35	0	7	145	110.5	-72	-28	10	129	84.5	33	21	-87	-27	-9	161	85.0	19
2	-76	-34	28	147	86.5	-67	-26	10	132	88.3	29	18	-83	-24	-8	163	89.3	20
3	-98	-56	34	155	74.5	-83	-40	13	137	78.6	27	19	-106	-40	-10	171	80.2	21
4	-105	-56	35	160	73.4	-89	-26	13	140	82.9	28	20	-112	-25	-10	173	85.0	22
5	-111	-60	38	160	71.2	-98	-36	14	143	78.6	24	18	-119	-36	-12	173	80.3	21

B. 28

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	79	127	44	7	83.3	53	98	15	10	63.0	65	127	11	9	64.0		
2	32	47	7	9	21.6	73	104	17	7	73.4	85	132	16	5	72.3		
3	16	16	12	8	7.2	26	70	4	12	31.5	33	90	7	12	31.2		
4	27	116	19	14	40.3	42	101	11	36	38.3	67	108	12	21	40.8		
5	14	30	5	6	11.7	7	9	3	9	2.8	7	10	4	6	3.6		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	79	129	44	7	83.3	53	98	15	10	63.0	65	127	11	9	64.0		
2	75	104	39	9	66.3	60	98	16	9	65.2	72	124	13	8	65.2		
3	66	86	32	12	53.8	53	84	13	12	55.3	66	112	11	14	55.1		
4	62	70	30	16	50.8	52	93	13	19	52.6	66	114	11	16	52.8		
5	57	82	27	15	46.1	50	86	12	19	48.1	61	105	11	14	48.5		

HEIGHT = 43.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
 START TIME 11:45: 0  
 END TIME 11:50: 0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-235	-60	61	446	75.7	-172	-69	16	188	68.0	8	8	-221	-77	-21	238	70.6	20
2	-241	-78	49	258	72.3	-192	-46	18	205	77.1	18	11	-239	-49	-18	253	78.1	25
3	-249	-47	44	275	79.9	-237	-59	23	246	75.8	5	3	-267	-55	-22	274	78.1	13
4	-257	-50	44	264	79.7	-233	-45	19	242	80.0	5	5	-255	-39	-20	263	82.3	13
5	-269	-34	60	274	82.6	-205	-92	17	232	63.9	18	15	-236	-88	-20	263	68.1	21

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-235	-60	61	446	75.7	-172	-69	16	188	68.0	8	8	-221	-77	-21	238	70.6	20
2	-238	-64	55	252	73.9	-183	-56	17	197	72.9	14	10	-231	-62	-19	246	74.6	23
3	-248	-62	52	259	75.8	-200	-57	19	212	73.8	11	8	-242	-60	-20	255	75.7	20
4	-250	-59	50	261	76.7	-208	-54	19	220	75.3	9	7	-245	-55	-20	257	77.3	18
5	-254	-53	52	264	78.0	-207	-63	18	222	72.8	11	9	-243	-62	-20	258	75.3	19

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	7	34	9	9	7.7	19	23	7	12	8.6	14	31	5	7	8.0
2	24	44	15	14	10.4	27	54	11	26	16.0	23	62	11	9	15.4
3	5	17	4	3	3.7	9	5	2	8	1.6	5	5	2	4	1.2
4	28	36	10	30	8.2	25	46	7	26	12.1	31	50	8	30	12.4
5	11	31	9	8	6.8	54	34	12	29	15.3	56	57	12	19	18.0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	7	34	9	9	7.7	19	23	7	12	8.6	14	31	5	7	8.0
2	16	39	13	13	9.0	25	43	9	22	13.5	21	50	9	11	12.7
3	20	34	12	15	8.2	33	35	8	29	11.1	24	41	7	16	10.5
4	22	35	12	19	8.2	34	37	8	31	11.4	26	43	7	20	11.1
5	21	35	12	18	8.2	38	39	9	31	13.0	34	48	8	20	13.1

HEIGHT = 28.

VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE MD 90.

START TIME 11:50:0  
END TIME 11:55:0

ONE MINUTE MEANS

MIN	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH	SP
1	-141	-67	47	166	63.5	-109	7	3	125	95.9	41	21	-141	23	163
2	-135	-67	36	154	63.5	-93	-51	12	129	70.2	30	25	-113	-49	162
3	-148	-88	56	178	59.0	-117	-92	15	153	51.3	15	14	-128	-105	171
4	-157	-79	48	181	63.1	-122	-60	10	151	64.9	29	17	-144	-67	181
5	-162	-75	50	183	65.3	-129	13	2	136	97.6	42	24	-165	36	177

CUMULATIVE MEANS

MIN	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH	SP
1	-141	-67	47	166	63.5	-109	7	3	125	95.9	41	21	-141	23	163
2	-138	-67	42	160	63.5	-102	-20	7	127	84.0	36	22	-128	-10	163
3	-141	-74	47	166	61.9	-107	-45	10	136	72.6	28	20	-128	-43	166
4	-145	-75	47	170	62.2	-111	-48	10	139	70.8	29	19	-132	-49	169
5	-148	-75	48	172	62.8	-114	-37	8	139	75.8	31	20	-138	-33	171

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH	SP
1	25	53	9	13	19.3	30	56	6	12	30.7	31	79	10	11	30.5
2	11	26	16	7	10.3	33	72	6	17	44.3	34	109	4	10	44.8
3	28	36	16	20	13.3	28	23	8	17	12.2	30	30	8	14	13.7
4	21	36	5	5	13.3	34	62	11	17	28.5	38	84	11	7	30.7
5	17	37	13	16	12.1	19	44	10	23	16.2	8	56	11	9	17.8

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH	SP
1	25	53	9	13	19.3	30	56	6	12	30.7	31	79	10	11	30.5
2	19	41	13	12	15.2	31	68	8	14	38.3	34	98	9	10	39.1
3	23	40	16	17	14.4	30	64	9	20	35.1	32	92	9	12	36.3
4	23	38	14	16	13.9	31	64	9	20	33.3	33	89	9	13	34.7
5	23	38	13	17	13.4	30	65	10	20	32.4	33	90	10	12	34.2

HEIGHT = 43.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
 START TIME 11:50:0  
 END TIME 11:55:0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V			W	SPEED		
1	-262	-61	54	273	76.5	-232	-70	22	245	72.7	4	3	-259	-69	-23	271	74.8	15
2	-276	-27	51	279	84.1	-197	-76	18	216	68.6	12	13	-251	-77	-20	267	72.5	18
3	-279	-65	45	289	76.7	-222	-48	19	233	78.6	20	18	-274	-37	-16	284	82.6	20
4	-284	-58	45	292	78.3	-268	-49	21	277	79.7	9	7	-286	-46	-19	293	80.7	12
5	-263	-77	58	282	73.3	-224	-78	15	241	70.0	11	7	-256	-83	-20	273	71.7	20

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D			U	V	W	SPEED
1	-262	-61	54	273	76.5	-232	-70	22	245	72.7	4	3	-259	-69	-23	271	74.8	15
2	-269	-43	52	276	80.6	-213	-73	20	229	70.5	8	8	-255	-73	-22	269	73.5	17
3	-273	-50	50	280	79.4	-216	-65	20	230	73.0	12	11	-261	-62	-20	274	76.4	18
4	-276	-52	49	284	79.1	-230	-61	20	243	74.8	11	10	-268	-57	-20	279	77.6	16
5	-273	-57	50	283	78.0	-229	-64	19	242	73.9	11	9	-265	-62	-20	278	76.5	17

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	21	43	5	10	9.9	21	25	3	13	7.1	22	29	3	13	7.2
2	6	21	10	5	4.3	21	33	11	7	10.4	30	42	9	9	11.1
3	21	30	14	18	6.3	33	51	15	32	13.9	13	66	12	13	13.7
4	10	24	6	6	4.9	17	43	13	19	9.1	9	36	7	7	7.2
5	33	58	7	5	13.9	34	28	12	26	8.6	23	36	8	11	8.6

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS			I SINE WAVE FIT			TH					
	U	V	W	TH	U	V	W	TH	U		V	W	SPEED		
1	21	43	5	10	9.9	21	25	3	13	7.1	22	29	3	13	7.2
2	16	36	8	8	8.1	27	29	9	18	8.9	26	35	7	11	9.2
3	18	35	11	13	7.6	28	38	11	22	11.0	24	48	9	13	11.3
4	17	32	10	13	6.9	35	39	11	30	10.8	24	45	8	14	10.4
5	21	38	10	11	8.7	34	37	11	29	10.5	24	44	8	14	10.2

HEIGHT = 20.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
 START TIME 11:55:0  
 END TIME 12:00:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-142	12	51	218	91.3	-120	-72	14	144	58.3	13	15	-147	-79	-13	177	61.0	29
2	-146	-78	49	173	61.8	-117	-18	12	140	88.1	21	17	-142	-7	-13	171	88.8	23
3	-147	-52	19	181	74.7	-112	-85	15	143	54.8	13	14	-136	-91	-14	167	56.0	20
4	-153	-23	44	196	79.7	-132	-84	20	159	57.2	12	9	-150	-92	-19	180	58.3	17
5	-152	-60	42	170	68.1	-105	-24	10	136	81.6	30	20	-130	-24	-9	167	81.5	24

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-142	12	51	218	91.3	-120	-72	14	144	58.3	13	15	-147	-79	-13	177	61.0	29
2	-144	-29	50	197	77.7	-119	-47	13	142	72.0	17	16	-145	-46	-13	174	73.9	26
3	-145	-37	40	192	76.8	-117	-59	14	142	66.0	15	16	-142	-60	-14	172	68.2	24
4	-147	-33	41	193	77.5	-121	-66	15	147	63.6	15	14	-144	-69	-15	174	65.6	22
5	-148	-38	41	189	75.8	-118	-58	14	145	67.0	18	15	-142	-60	-14	173	68.5	23

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	76	174	67	65	48.0	28	23	7	15	13.5	37	45	9	13	19.1
2	26	43	10	8	16.3	44	64	9	21	38.5	43	93	8	10	37.1
3	59	89	30	48	35.9	16	17	6	15	7.3	20	20	5	17	7.7
4	30	130	14	40	36.5	19	17	7	7	9.1	20	25	6	4	10.1
5	21	44	12	8	16.4	30	85	12	10	42.4	32	107	7	11	41.6

CUMULATIVE STANDARD DEVIATIONS

IN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	76	174	67	65	48.0	28	23	7	15	13.5	37	45	9	13	19.1
2	56	135	48	52	38.7	35	54	7	18	30.8	38	77	8	11	31.1
3	55	120	44	50	36.9	30	47	7	16	27.1	33	68	7	13	27.0
4	44	120	38	47	36.0	28	44	7	16	23.7	30	60	7	12	23.9
5	45	110	35	43	33.2	28	54	8	16	28.2	30	71	8	12	27.9

HEIGHT = 43.  
VAD OT152 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE MD 90.  
START TIME 11:55: 0  
END TIME 12: 0: 0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	W SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED		
1	-267	47	38	324	97.3	-154	-124	10	206	52.4	26	21	-239	-159	-9	299	57.1	51
2	-247	-43	38	474	79.9	-192	-53	15	222	71.4	18	17	-242	-39	-15	276	78.9	26
3	-252	-79	30	480	73.8	-186	-74	16	204	67.8	16	13	-251	-70	-15	263	74.2	19
4	-243	-72	47	458	73.1	-218	-63	18	229	73.6	7	5	-250	-65	-19	260	75.2	14
5	-242	-48	32	451	78.6	-209	-75	17	226	70.1	5	4	-237	-69	-15	252	73.4	15

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED		
1	-267	47	38	324	97.3	-154	-124	10	206	52.4	26	21	-239	-159	-9	299	57.1	51
2	-256	-1	36	297	87.9	-175	-86	13	214	62.6	22	19	-240	-94	-12	287	68.8	37
3	-255	-25	35	291	83.5	-178	-82	14	211	64.3	20	17	-244	-87	-13	279	70.5	31
4	-252	-37	37	283	81.0	-188	-77	15	215	66.6	17	14	-245	-82	-14	275	71.7	27
5	-250	-39	36	277	80.5	-192	-77	15	217	67.2	15	12	-244	-79	-14	270	72.0	25

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I. FOURIER COEFFICIENTS				I SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	24	189	22	66	36.1	36	63	8	48	15.2	53	84	13	47	16.5
2	22	114	19	13	24.6	41	107	12	50	24.4	20	140	9	40	27.1
3	23	101	22	33	19.2	23	27	8	16	9.0	19	33	7	14	7.8
4	19	40	8	10	9.5	7	19	4	6	4.7	5	13	2	5	2.7
5	15	39	13	8	9.5	17	34	9	7	9.5	20	38	8	7	9.8

CUMULATIVE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT				
	U	V	W	TH	U	V	W	TH	U	V	W	TH			
1	74	189	29	66	36.1	36	63	8	48	15.2	53	84	13	47	16.5
2	52	154	23	51	30.4	42	93	10	48	22.1	37	129	11	40	24.7
3	44	141	25	46	27.7	37	74	10	40	18.8	32	107	10	38	20.7
4	34	126	22	42	24.8	36	64	9	36	17.0	28	94	9	34	18.1
5	36	114	20	40	22.5	34	63	9	34	15.7	27	85	9	32	16.7

HEIGHT = 28.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE HU 90.  
 START TIME 11:30: 0  
 END TIME 11:35: 0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-134	-38	36	146	74.5	-105	-43	21	121	68.2	26	12	-131	-51	-12	149	69.0	18
2	-125	-68	37	145	61.2	-104	-27	23	122	77.5	27	12	-122	-20	-17	153	81.5	18
3	-133	-41	35	148	72.8	-91	-22	9	115	80.0	40	18	-117	-15	-7	152	83.8	22
4	-123	-28	26	136	75.9	-79	-26	16	105	74.8	38	24	-109	-35	-7	148	75.1	22
5	-117	-57	36	142	63.2	-99	-9	16	116	84.9	34	19	-128	-2	-11	154	89.5	21

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-134	-38	36	146	74.5	-105	-43	21	121	68.2	26	12	-131	-51	-12	149	69.0	18
2	-130	-52	36	146	68.4	-105	-36	22	122	72.5	27	12	-127	-36	-15	151	74.8	18
3	-131	-49	36	146	69.8	-100	-32	18	119	74.8	31	14	-124	-30	-12	152	77.6	19
4	-129	-43	33	144	71.4	-95	-30	17	116	74.8	33	16	-120	-31	-11	151	76.9	20
5	-127	-46	34	143	69.9	-95	-25	17	116	76.7	33	17	-122	-26	-11	151	79.3	20

B 34

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH
1	10	42	7	6	17.7	7	39	4	4	19.3	11	48	7	5	19.4	5	19.4
2	11	17	7	4	7.8	16	60	14	4	31.7	29	94	4	15	38.0	15	38.0
3	18	49	18	8	20.0	23	63	10	9	39.6	35	98	8	5	42.8	5	42.8
4	20	47	7	13	21.2	23	64	10	8	41.3	40	92	6	11	43.7	11	43.7
5	33	47	10	9	23.4	20	59	15	6	32.9	29	88	8	7	36.4	7	36.4

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH
1	10	42	7	6	17.7	7	39	4	4	19.3	11	48	7	5	19.4	5	19.4
2	11	36	7	5	15.1	11	44	11	4	25.0	21	71	6	11	28.8	11	28.8
3	13	39	11	6	16.4	16	54	12	7	29.4	25	79	4	9	32.9	9	32.9
4	15	41	11	7	17.6	20	55	11	9	32.2	30	81	4	9	35.2	9	35.2
5	19	42	11	7	18.6	20	56	12	9	32.0	30	81	7	9	35.2	9	35.2

HEIGHT = 43.  
 VAD OTIS2 TIME IN GMT CT VAD 9/16/76 OTIS AIRFORCE MD 90.  
 START TIME 11:30: 0  
 END TIME 11:35: 0

ONE MINUTE MEANS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	-236	-9	66	241	87.5	-37	60	0	113	137.4	17	-61	92	-10
2	-227	-12	52	240	85.9	-70	2	4	118	97.8	26	-138	21	-10
3	-229	-45	64	240	78.8	-41	44	2	117	136.8	29	-81	83	-10
4	-225	-23	29	231	83.2	3	105	-2	110	181.0	43	12	165	-12
5	-191	5	66	229	95.0	-37	31	1	116	130.5	35	-69	60	-6
														194
														136.9
														38

CUMULATIVE MEANS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	-236	-9	66	241	87.5	-37	60	0	113	137.4	17	-61	92	-10
2	-231	-10	59	240	86.7	-55	29	2	116	116.1	42	-102	53	-10
3	-231	-21	60	240	84.2	-50	34	2	116	122.6	38	-96	63	-10
4	-229	-22	53	238	83.9	-37	51	1	115	136.6	39	-70	87	-11
5	-221	-16	56	236	85.4	-37	46	1	115	135.3	38	-69	81	-10
														193
														140.4
														38

ONE MINUTE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	14	45	30	13	10.8	48	84	5	6	59.2	104	132	15	21
2	28	75	22	14	19.5	48	90	8	13	59.4	94	134	10	21
3	20	51	15	13	13.1	76	72	7	8	64.7	141	111	10	22
4	30	42	13	24	11.7	35	8	1	3	18.9	66	15	6	6
5	41	108	11	10	37.0	73	87	12	14	71.9	135	129	17	32
														70.3

CUMULATIVE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED
1	14	45	30	13	10.8	48	84	5	6	59.2	104	132	15	21
2	22	60	26	13	15.5	49	87	7	10	60.4	103	132	12	22
3	21	58	23	13	14.9	57	84	6	9	60.7	112	124	11	21
4	23	54	25	16	13.9	57	77	6	9	59.1	112	116	10	21
5	44	68	23	15	20.9	60	80	8	10	60.9	115	117	12	23
														58.5

HEIGHT = 28. VAD OT154 TIME IN GMT CT VAD 9/18/76 OT15 AIRFORCE MD 90. START TIME 3:20:0 END TIME 3:25:0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP							
1	-188	453	55	325	143.2	-171	206	25	281	140.2	18	14	-190	234	-17	316	140.9	28
2	-140	229	36	278	149.0	-117	202	21	240	151.0	18	8	-116	240	-14	275	154.2	25
3	-153	433	71	286	145.5	-166	177	26	245	137.2	19	19	-183	219	-25	287	139.6	17
4	-183	201	33	282	137.0	-180	184	14	246	139.1	20	17	-180	223	-12	288	141.0	29
5	-160	237	50	290	146.1	-117	207	23	244	151.3	15	9	-124	248	-19	282	153.4	26

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS					SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	3D	U	V	W	SPEED	TH	SP	
1	-148	453	55	325	143.2	-171	206	25	281	140.2	18	14	-190	234	-17	316	140.9	28
2	-162	246	45	300	146.4	-142	204	23	259	146.0	18	11	-150	237	-16	294	148.1	27
3	-160	238	52	296	146.1	-149	197	24	255	143.6	19	13	-159	232	-18	292	145.7	24
4	-166	229	47	293	143.8	-152	194	21	253	142.5	19	14	-165	230	-17	291	144.5	25
5	-164	231	48	292	144.3	-145	197	21	251	144.2	18	13	-156	233	-17	289	146.3	25

ONE MINUTE STANDARD DEVIATIONS

PEAKS			I, FOURIER COEFFICIENTS						I SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	60	61	41	35	15.1	66	61	22	11	18.5	81	69	16	23	19.3
2	74	26	22	20	16.4	63	24	15	34	14.4	66	26	14	17	14.6
3	50	56	25	34	13.7	26	23	13	30	3.8	25	43	4	37	6.5
4	51	64	30	23	16.7	37	14	17	30	5.9	31	19	10	24	5.4
5	46	27	6	20	9.9	51	27	17	32	12.4	52	28	10	20	11.7

CUMULATIVE STANDARD DEVIATIONS

PEAKS			FOURIER COEFFICIENTS					SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	66	61	41	35	15.1	66	61	22	11	18.5	81	69	16	23	19.3
2	72	45	32	36	15.4	67	43	18	33	16.7	80	48	15	29	17.6
3	65	47	32	35	14.6	54	39	16	32	14.7	70	46	13	30	15.6
4	62	53	32	33	15.3	54	35	17	31	13.1	63	41	13	28	13.8
5	58	49	29	30	14.3	54	34	16	31	13.2	62	39	12	27	13.7

HEIGHT = 43.  
 VAD 0154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90.  
 START TIME 3:20: 0  
 END TIME 3:25: 0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	TH	U	V	W	TH	U	V	W	TH			SP			
1	-205	450	74	332	139.9	-176	204	36	278	136.6	27	20	-206	235	-30	330	136.6	20
2	-196	215	38	499	137.8	-161	185	26	247	138.9	16	10	-194	222	-18	298	138.9	20
3	-174	259	66	314	146.1	-157	215	29	268	143.5	23	13	-165	256	-28	307	146.7	17
4	-149	274	61	322	150.8	-148	201	26	256	141.9	25	16	-173	240	-19	312	142.9	28
5	-144	238	35	301	144.4	-118	205	22	238	150.2	20	11	-133	254	-15	291	152.2	22

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V			W	SPEED		
1	-205	450	74	332	139.9	-176	204	36	278	136.6	27	20	-206	235	-30	330	136.6	20
2	-201	234	58	317	138.9	-169	195	31	263	137.7	22	15	-200	229	-25	315	137.7	20
3	-193	242	60	317	141.2	-165	202	31	265	139.5	22	15	-189	238	-26	312	140.5	19
4	-181	250	60	318	143.8	-160	201	29	263	140.2	23	15	-185	238	-24	312	141.1	22
5	-178	248	56	315	143.9	-152	202	28	258	142.0	22	14	-175	241	-22	308	143.2	22

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	48	68	37	35	13.4	18	82	18	45	17.3	38	110	20	31	21.5
2	56	49	15	15	13.9	21	19	5	15	5.3	32	21	6	10	7.2
3	56	38	41	32	10.9	23	34	6	28	6.4	23	44	7	36	6.2
4	67	61	24	31	15.5	28	62	12	35	14.7	61	90	17	24	20.4
5	68	67	25	25	18.1	32	16	13	20	7.5	40	31	9	22	9.4

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS			J SINE WAVE FIT								
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	48	68	37	35	13.4	18	82	18	45	17.3	38	110	20	31	21.5
2	50	60	34	32	13.1	20	60	14	37	12.8	34	79	16	28	15.9
3	52	55	35	31	12.6	21	53	12	34	11.3	35	70	14	30	14.1
4	54	57	32	30	13.8	24	54	12	33	12.0	43	74	14	28	15.6
5	58	58	32	30	14.4	30	49	12	33	11.9	46	68	14	28	15.2

START TIME 3:25: 0  
END TIME 3:30: 0

44 90.

OTIS AIR FORCE

4/18/76

VAD

1000

$$\text{rank}(G_{\text{red}}) = 2n.$$

ONE MINUTE MEANS

PEAKS	FOURIER COEFFICIENTS				SINE WAVE FIT												
	U	V	W	TH	2D	3D	U	V	W	TH	SP						
1	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
2	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
3	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
4	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
5	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
6	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
7	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
8	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
9	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
10	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
11	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
12	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
13	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
14	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
15	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
16	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
17	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
18	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
19	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
20	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
21	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
22	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
23	174	420	50	245	141.4	-146	167	21	242	134.5	16	-187	190	-15	276	134.8	22
24	174	420	50	245	141.4	-146	1										

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS				SINE WAVE FIT						
	W	V	W	V	U	TH	2U	3U	U	V	W	TH	SP
MIN	U	Y	W <td>SPEED<td>TH</td><td>U</td><td>2U</td><td>3U</td><td>U</td><td>V</td><td>W<td>TH</td><td>SP</td></td></td>	SPEED <td>TH</td> <td>U</td> <td>2U</td> <td>3U</td> <td>U</td> <td>V</td> <td>W<td>TH</td><td>SP</td></td>	TH	U	2U	3U	U	V	W <td>TH</td> <td>SP</td>	TH	SP
1	-174	420	50	285	141.8	146	16	16	-187	190	-15	276	22
2	-170	434	51	301	144.9	200	13	11	-187	222	-17	297	18
3	-124	453	57	322	142.9	219	15	11	-190	248	-19	318	18
4	-124	453	54	327	141.3	207	17	13	-191	242	-17	323	22
5	-124	453	54	327	141.3	207	17	13	-192	249	-19	326	22

ONE MINUTE STANDARD DEVIATIONS

PEAKS				I <sub>h</sub>				FOURIER COEFFICIENTS				I <sub>h</sub> SINE WAVE FIT			
U	V	N	SPEED	TH	U	V	N	SPEED	TH	U	V	N	SPEED	TH	
1	32	13	16	10.7	31	5.0	11	31	13.1	40	67	9	25	16.2	
2	40	7	22	5.1	14	31	7	27	4.2	14	32	5	28	4.0	
3	49	30	31	6.5	19	24	13	19	5.0	21	30	8	26	4.1	
4	63	52	28	14.4	142	24	27	55	35.4	184	31	21	17	35.2	
5	63	17	21	16.6	21	32	8	30	4.5	21	41	11	27	6.4	

CUMULATIVE STANDARD DEVIATIONS

MILES	V	I				FOURIER COEFFICIENTS				SINE WAVE FIT				TH
		U	W	SPED	TH	U	V	W	SPED	TH	U	V	W	
0	32	14	10.7	31	53	11	31	13.1	40	47	9	25	16.2	
1	46	19	9.0	25	51	9	40	10.5	29	43	8	34	12.7	
2	36	40	4.5	25	52	17	43	9.0	26	64	8	34	11.0	
3	51	39	4.5	27	52	17	45	17.7	45	58	12	39	18.4	
4	55	41	3.0	47	52	17	42	15.8	76	56	12	37	16.5	
5	54	41	10.2	60	51	16	42							

HEIGHT = 43. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 3:25: 0 END TIME 3:30: 0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT																					
PEAKS		I		TH		U		V		W		SPEED		TH		20		30		U		V		W		SPEED		TH		SP	
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP								
1	-141	437	40	301	142.7	-166	174	15	247	137.4	17	15	-185	220	-13	291	140.3	22													
2	-142	488	51	343	147.5	-175	214	26	278	140.4	23	19	-204	273	-15	342	142.9	17													
3	-206	521	70	383	147.1	-169	245	22	306	144.6	26	17	-196	287	-16	360	144.9	33													
4	-265	285	71	371	133.7	-237	221	31	326	133.0	19	9	-257	257	-23	365	134.7	23													
5	-167	285	47	338	149.4	-175	135	6	252	125.0	34	31	-222	149	-2	321	123.1	47													

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT														
PEAKS					I					I					W			SPEED			TH		SP	
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP						
1	-181	237	40	301	142.7	-166	173	15	247	137.4	17	15	-185	220	-13	291	140.3	22						
2	-182	264	46	324	145.3	-171	197	21	264	139.1	21	17	-195	248	-14	319	141.7	19						
3	-184	282	53	342	145.8	-170	212	21	277	140.8	22	17	-196	260	-15	332	142.7	24						
4	-210	275	58	350	142.6	-188	215	24	290	138.7	21	15	-212	259	-17	341	140.6	24						
5	-202	277	56	348	143.9	-186	200	20	283	136.1	24	18	-214	239	-14	337	137.3	28						

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH							
1	44	26	31	24	8.4	47	30	5	36	10.0		52	26	7	34	9.5													
2	38	37	19	34	6.9	28	32	26	28	6.6		19	36	13	32	4.2													
3	26	36	23	30	5.0	55	68	18	37	16.0		69	79	11	29	17.0													
4	28	43	29	25	6.9	33	26	12	31	5.2		21	37	8	29	5.2													
5	64	38	24	14	12.4	71	118	17	45	32.1		106	162	21	21	36.6													

CUMULATIVE STANDARD DEVIATIONS

I, FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	44	26	31	26	8.4	47	30	5	36	10.0	52	26	7	34	9.5
2	34	41	25	37	7.7	37	35	19	34	8.1	38	41	10	41	6.9
3	37	47	26	44	6.9	41	51	18	40	11.1	48	57	10	42	10.7
4	48	47	26	42	8.7	49	45	17	43	10.3	50	51	10	41	10.1
5	53	45	27	38	9.7	53	70	18	45	16.8	62	61	14	39	18.6

HEIGHT = 28. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 3:30: 0  
END TIME 3:35: 0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	-200	205	26	295	135.8	-173	153	16	240	131.5	22	25	-209	193	26
2	-217	246	25	348	140.5	-179	212	8	290	139.5	15	20	-220	259	20
3	-173	275	55	326	147.9	-162	220	34	275	143.3	21	18	-189	265	18
4	-185	253	57	314	142.7	-196	89	1	234	110.2	43	43	-254	99	44
5	-153	214	27	269	144.5	-147	189	26	242	142.2	14	13	-163	223	16

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	-200	205	26	295	135.8	-173	153	16	240	131.5	22	25	-209	193	26
2	-209	236	25	322	138.1	-176	183	12	260	135.5	18	22	-214	226	23
3	-196	250	36	323	141.7	-171	196	20	265	138.4	20	21	-205	240	21
4	-193	251	41	322	142.0	-177	171	16	258	131.6	25	26	-217	206	27
5	-184	243	38	310	142.5	-171	175	18	254	133.9	23	23	-205	210	24

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	61	60	16	46	14.3	49	57	10	31	16.3	59	62	5	31	15.2
2	46	46	27	33	9.2	33	47	26	50	6.1	35	28	14	30	5.6
3	37	22	15	32	5.0	18	30	13	29	4.1	14	27	11	23	3.4
4	21	65	12	47	9.5	22	111	15	57	24.3	51	164	21	43	31.3
5	51	35	16	16	12.8	28	12	7	18	5.9	30	19	6	18	6.4

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH	SP
1	61	60	16	46	14.3	49	57	10	31	16.3	59	62	5	31	15.2
2	52	60	21	47	11.7	40	59	19	44	12.4	46	57	10	38	11.4
3	44	54	24	41	10.8	33	53	20	39	10.7	39	51	11	33	9.9
4	44	54	23	42	10.3	33	43	21	45	14.9	46	107	15	35	21.4
5	48	52	22	44	10.7	34	73	19	41	17.4	48	94	14	36	19.7

HEIGHT = 43. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 3:30:0 END TIME 3:35:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	I		I					I					I					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-180	464	33	325	145.0	-171	215	16	276	141.6	13	8	-178	251	-10	309	144.6	23
2	-200	281	24	347	144.4	-174	209	23	277	139.5	23	20	-208	251	-10	333	139.7	27
3	-194	472	64	337	144.4	-155	230	25	279	146.2	14	10	-180	267	-23	323	146.1	22
4	-201	271	62	348	142.5	-170	244	26	303	144.7	14	10	-180	279	-20	341	146.7	25
5	-226	224	44	323	134.9	-169	217	22	277	142.3	16	9	-187	250	-18	315	143.3	22

CUMULATIVE MEANS

MIN	U	V	W	FOURIER COEFFICIENTS										SINE WAVE FIT				SP
				* SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	
1	-180	464	33	325	145.0	-171	215	16	276	141.6	13	8	-178	251	-10	309	144.6	23
2	-189	472	29	335	144.7	-172	212	19	277	140.6	17	14	-192	251	-10	320	142.3	25
3	-191	472	40	336	144.6	-167	218	21	278	142.4	17	13	-188	256	-14	321	143.5	24
4	-194	472	46	339	144.0	-168	225	22	284	143.0	16	12	-186	262	-16	327	144.4	24
5	-200	263	45	336	142.3	-168	224	22	293	142.9	16	11	-186	260	-16	324	144.2	24

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I, SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	40	56	21	34	10.7	26	15	11	23	4.0	28	16	11	21	4.6
2	24	28	13	21	5.1	39	52	15	29	12.6	42	64	11	27	12.8
3	42	31	35	24	7.3	32	12	12	23	5.2	25	9	8	14	4.1
4	59	77	26	35	15.2	45	51	9	39	11.1	66	59	7	34	14.3
5	54	31	33	21	10.2	39	19	7	25	7.0	37	21	9	29	5.7

CUMULATIVE STANDARD DEVIATIONS

MIN	MEANS				I, FOURIER COEFFICIENTS				I, SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	40	56	21	34	10.7	26	15	11	23	4.0	28	16	11	21	4.6
2	34	45	18	30	8.3	31	35	13	25	8.7	37	43	11	26	9.2
3	35	40	29	29	7.8	32	31	13	24	8.1	33	36	12	22	8.0
4	42	51	29	30	10.0	35	34	12	30	8.4	43	44	11	27	9.9
5	45	51	29	29	10.5	35	35	11	29	8.4	41	40	10	27	9.2

START TIME 3:35:0  
END TIME 3:40:0

HD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

OTIS4

VAD

HEIGHT = 28.

# ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-155	213	14	269	143.5	-135	185	16	232	143.2	15	14	-158	217	-11	272	143.7	19
2	-143	237	22	281	149.0	-167	187	21	253	138.2	12	7	-179	214	-16	281	140.1	19
3	-197	207	65	291	136.0	-164	174	24	246	137.6	20	16	-182	211	-23	287	140.0	21
4	-186	204	59	481	137.4	-184	163	29	248	131.3	17	17	-203	195	-25	283	133.9	14
5	-233	212	62	322	132.8	-201	189	30	278	133.9	18	17	-226	224	-24	322	135.1	23

# CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-155	213	14	269	143.5	-135	185	16	232	143.2	15	14	-158	217	-11	272	143.7	19
2	-149	225	18	275	146.3	-151	186	19	243	140.7	14	11	-168	215	-13	276	141.9	19
3	-167	214	35	281	142.5	-156	182	21	244	139.6	16	13	-173	214	-17	280	141.2	20
4	-171	214	41	281	141.3	-163	177	23	245	137.6	16	14	-180	209	-19	281	139.4	18
5	-185	214	45	290	139.4	-171	180	24	252	136.8	17	14	-190	212	-20	290	138.5	19

# ONE MINUTE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS							I SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	30	44	11	19	11.4	25	34	11	24	8.6	30	28	5	11	8.5		
2	43	18	25	17	10.0	33	23	8	21	7.6	36	20	8	20	7.1		
3	37	44	40	24	10.5	61	26	19	31	15.0	73	24	15	21	15.4		
4	52	35	22	11	12.8	26	26	14	27	6.1	29	17	9	16	6.0		
5	61	41	38	37	12.5	58	33	18	57	7.4	52	32	17	41	8.4		

# CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS						SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	34	44	11	19	11.4	25	34	11	24	8.6	30	28	5	11	8.5
2	42	35	19	19	10.8	32	24	10	25	8.1	34	24	7	16	7.7
3	46	38	45	22	11.6	44	27	14	26	10.9	50	23	11	19	10.8
4	47	37	41	19	11.8	42	27	14	26	10.5	47	23	11	18	10.2
5	56	37	41	29	12.3	47	29	15	37	9.9	51	25	13	29	9.9

START TIME 3:35: 0  
END TIME 3:40: 0

HD 90.

OTIS AIRFORCE

9118176

YAD

TIME IN GAT

ADDITIONAL INFORMATION

HEIGHT = 43.

ONE MINUTE MEANS

[illegible]

CUMULATIVE MEANS

[illegible]

## ONE MINUTE STANDARD DEVIATIONS

Run	Peaks				I, Fourier Coefficients				I, Sine Wave Fit			
	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	37	35	10	13	27	24	6	25	28	24	7	8
2	44	44	20	27	31	29	8	24	36	38	7	8.6
3	40	34	42	16	21	19	10	15	22	15	13	17
4	41	41	22	17	19	19	9	11	25	22	10	13
5	34	34	22	17	20	19	14	22	49	70	17	38
6	34	34	22	17	20	19	14	22	49	70	17	38

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS						I SINE WAVE FIT				TH	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W		SPEED
1	37	35	10	18	9.4	27	24	6	25	6.1	28	24	7	8	7.3
2	45	42	20	29	10.5	34	26	8	28	7.1	40	31	7	21	8.7
3	43	39	24	25	10.0	31	24	9	25	6.5	35	27	9	20	7.6
4	42	40	27	23	10.2	27	22	9	22	6.4	33	26	10	18	7.2
5	45	43	30	27	10.7	33	31	10	25	8.2	36	37	11	25	8.4

START TIME 3:40:0  
END TIME 3:45:0

HD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

VAD OTIS4

HEIGHT = 2H.

# ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-195	259	82	338	142.8	-160	215	19	272	143.7	27	21	-167	269	-16	325	148.2	30	
2	-229	219	41	330	133.0	-202	192	26	285	132.8	14	13	-220	227	-16	323	138.4	27	
3	-195	267	64	351	146.4	-183	237	25	304	142.6	18	11	-191	275	-19	341	145.0	29	
4	-242	256	72	356	136.7	-213	206	24	315	133.0	17	19	-226	240	-21	348	136.4	34	
5	-279	200	72	351	125.7	-182	159	11	261	131.4	31	17	-214	216	-16	327	134.2	42	

# CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-195	259	82	338	142.8	-160	215	19	272	143.7	27	21	-167	269	-16	325	148.2	30	
2	-213	237	60	334	137.5	-183	202	23	279	137.9	20	17	-195	247	-16	324	141.3	28	
3	-204	253	61	339	140.3	-183	213	23	287	139.4	19	15	-194	256	-17	329	142.5	28	
4	-213	254	64	343	139.5	-190	212	23	294	137.8	19	16	-202	252	-18	334	141.0	30	
5	-228	242	66	345	136.5	-188	200	21	287	136.4	21	16	-204	244	-18	332	139.5	32	

# ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH		
1	79	73	34	30	17.9	56	49	19	56	11.4	70	43	23	27	23	27	14.0		
2	59	83	37	19	17.9	33	58	20	20	17.9	37	59	15	22	15	22	11.8		
3	65	66	23	26	14.7	56	51	14	52	11.1	57	54	12	42	12	42	11.6		
4	44	38	26	31	8.8	76	90	22	31	20.5	93	79	16	13	13	20.3			
5	64	62	38	53	11.8	80	77	19	38	24.0	81	105	17	31	31	23.1			

# CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH		
1	79	73	34	30	17.9	56	49	19	56	11.4	70	43	23	27	23	27	14.0		
2	68	78	42	24	17.9	49	53	19	39	13.0	59	55	18	24	18	24	14.0		
3	76	76	36	25	17.1	49	54	17	44	12.3	57	54	16	31	16	31	13.1		
4	69	68	34	27	15.4	57	62	18	42	14.5	66	60	16	29	16	29	14.9		
5	69	70	34	34	15.6	61	64	18	43	16.8	69	72	16	29	16	29	16.8		

VAD 0154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HQ 90.  
 mEgnt = 43.  
 START TIME 3:40:0  
 END TIME 3:45:0

ONE MINUTE MEANS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT							
	I					J					K							
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-248	108	76	372	125.7	-179	223	27	292	142.1	24	13	-206	275	-24	352	143.1	30
2	-265	196	59	377	126.4	-177	227	16	302	142.4	23	15	-207	284	-16	366	143.6	32
3	-264	274	40	392	135.9	-170	229	19	294	143.7	33	19	-199	298	-18	366	145.9	38
4	-289	232	61	379	129.2	-277	210	30	350	126.9	14	8	-288	240	-23	378	129.6	18
5	-276	260	69	384	133.3	-232	229	38	329	134.8	21	11	-245	274	-29	372	138.2	28

CUMULATIVE MEANS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT								
	PEAKS					I					I								
	U	V	W	^	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-248	108	179	76	372	125.7	-179	223	27	292	142.1	24	13	-206	275	-24	352	143.1	30
2	-250	192	178	67	375	126.0	-178	225	22	297	142.3	23	14	-207	280	-20	359	143.3	31
3	-255	222	175	72	381	129.7	-175	226	21	296	142.8	27	16	-204	286	-19	362	144.3	33
4	-266	226	199	69	381	129.5	-199	222	23	309	139.0	24	14	-224	275	-20	366	140.8	30
5	-260	232	206	64	381	130.3	-206	224	26	313	138.2	23	13	-228	275	-22	367	140.3	29

B-45

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS										I, FOURIER COEFFICIENTS					I SINE WAVE FIT				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH					
1	90	207	38	37	37.2	70	33	8	41	14.1	70	51	12	37	13.0					
2	43	184	40	32	31.3	90	57	15	37	19.2	91	72	10	37	17.9					
3	66	85	21	22	15.6	66	46	19	32	14.3	60	56	13	24	12.6					
4	43	53	26	19	10.0	20	40	7	22	6.5	25	43	11	23	6.8					
5	55	41	34	32	9.2	47	24	9	31	7.4	52	42	11	30	9.2					

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH										
1	90	207	38	37	37.2	70	33	8	41	14.1	70	51	12	37	13.0															
2	83	166	33	33	32.8	77	44	13	38	16.0	77	60	11	36	14.9															
3	75	159	33	30	27.6	71	44	15	35	15.0	70	58	12	32	13.8															
4	69	140	31	27	24.3	77	43	14	40	15.1	72	57	11	30	13.9															
5	60	127	32	26	22.1	77	37	14	39	13.7	68	54	12	30	13.0															

START TIME 3:45: 0  
END TIME 3:50: 0

OTIS AIRFORCE MD 90.

VAD OTIS4 TIME IN GHT CT VAD 9/18/76

HEIGHT = 28.

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-195	214	50	297	138.3	-185	202	25	275	137.6	13	9	-183	233	-23	297	141.8	17	
2	-208	234	41	314	138.2	-181	205	30	276	138.6	14	7	-188	233	-28	301	141.0	22	
3	-186	214	65	299	140.2	-204	169	24	269	128.8	16	9	-221	192	-23	295	130.8	24	
4	-205	105	43	244	116.1	-197	86	15	220	112.9	17	20	-220	95	-13	247	112.5	26	
5	-212	93	57	249	112.6	-186	123	32	225	123.6	14	15	-211	138	-25	255	123.1	19	

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-195	214	50	297	138.3	-185	202	25	275	137.6	13	9	-183	233	-23	297	141.8	17	
2	-204	226	66	306	138.2	-181	203	27	275	138.1	13	8	-186	233	-25	299	141.4	19	
3	-197	224	65	303	138.9	-191	192	24	273	135.0	14	8	-198	219	-25	298	137.9	21	
4	-199	191	59	287	132.5	-193	162	24	258	128.8	15	12	-204	184	-21	283	130.8	22	
5	-201	172	59	279	128.7	-192	155	26	252	127.8	15	12	-205	176	-22	278	129.3	22	

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	46	36	12	30	10.0	32	11	7	27	4.3	28	13	6	26	3.2				
2	25	31	27	34	3.9	34	25	17	26	6.6	35	24	12	27	6.0				
3	80	36	17	22	16.8	16	25	17	15	5.4	18	23	12	12	5.2				
4	37	79	22	27	20.5	15	49	13	21	11.8	15	61	13	24	13.2				
5	26	97	23	17	23.9	24	14	4	17	6.7	21	31	9	15	7.7				

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	46	36	12	30	10.0	32	11	7	27	4.3	28	13	6	26	3.2				
2	36	33	25	32	7.2	31	14	10	25	5.3	30	18	9	25	4.6				
3	52	33	24	29	10.9	29	26	10	22	6.9	31	28	10	21	6.9				
4	48	73	24	39	17.2	26	59	12	32	13.1	29	69	12	32	14.6				
5	45	86	24	34	15.7	26	55	12	33	12.2	28	65	11	31	13.8				

HEIGHT = 43.  
START TIME 3:45:0  
END TIME 3:50:0

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN		U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP		
1		-206	235	44	317	138.9	-174	192	20	260	138.1	19	16	-195	242	-20	312	141.3	17
2		-207	280	68	360	143.5	-162	173	14	248	136.5	34	23	-194	255	-18	330	141.5	36
3		-215	186	44	304	130.2	-211	130	17	252	121.9	24	17	-246	164	-20	301	123.6	23
4		-224	120	47	257	117.9	-192	96	19	226	113.2	26	22	-216	103	-11	262	114.5	22
5		-194	156	49	255	128.2	-183	103	20	223	116.6	23	23	-203	110	-16	257	117.1	22

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT										
MIN	PEAKS					I					I					SP				
	U	V	W	TH	SP	TH	U	V	W	TH	SP	TH	U	V	W	TH	SP			
1	-206	235	44	317	138.9	-174	192	20	260	138.1	19	18	-195	242	-20	312	141.3	17		
2	-207	259	68	340	141.4	-167	182	14	254	137.3	27	21	-195	249	-19	322	141.4	27		
3	-210	236	62	329	137.8	-181	166	15	253	132.4	26	20	-211	222	-19	315	135.8	26		
4	-213	208	58	311	133.0	-184	149	16	247	127.8	26	20	-212	194	-17	302	130.7	25		
5	-209	197	56	299	132.0	-184	139	17	241	125.4	25	21	-210	175	-17	292	127.7	24		

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS					SINE WAVE FIT																		
MIN	U			W			TH			U			V			W			TH			U			V			W			TH		
1	50	34	29	36	9.3	42	31	15	50	3.4	36	16	7	34	3.6																		
2	42	68	29	48	15.2	55	55	7	16	17.7	48	77	12	36	14.8																		
3	66	96	34	40	21.9	40	39	25	35	9.9	31	48	22	12	10.8																		
4	16	33	27	21	6.7	24	77	16	37	21.5	18	114	19	18	25.8																		
5	25	46	28	14	11.7	20	79	12	25	23.0	17	120	16	15	27.9																		

CUMULATIVE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	50	34	27	36	9.3	42	31	15	50	3.4	36	16	7	34	3.6
2	66	58	36	47	12.6	48	45	13	35	12.7	41	56	10	35	10.7
3	64	78	35	43	16.3	49	49	17	34	13.8	45	66	14	31	13.5
4	57	85	34	50	16.9	44	63	16	36	17.6	40	93	15	36	19.0
5	52	81	32	50	15.8	40	64	15	35	19.1	36	104	15	38	21.5

HEIGHT = 200  
 VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 3:50:0  
 END TIME 3:55:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V
1	-214	136	65	257	122.2	-172	124	18	216	126.8	24	13
2	-176	141	21	431	128.1	-168	104	16	204	121.9	15	22
3	-227	175	59	235	148.8	-176	75	17	224	118.4	19	19
4	-227	175	72	242	126.6	-153	192	22	259	143.1	22	16
5	-167	143	53	286	131.2	-197	121	25	234	120.6	17	13

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V
1	-214	136	65	257	122.2	-172	124	18	216	126.8	24	13
2	-197	134	95	445	124.9	-170	119	17	210	124.5	20	17
3	-146	149	49	242	132.5	-172	105	17	215	122.6	20	18
4	-142	156	55	256	130.9	-167	129	19	227	128.1	20	17
5	-180	154	56	261	130.9	-172	127	20	228	126.7	20	16

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V
1	33	42	25	35	8.7	32	23	10	35	4.7	28	26
2	36	55	23	39	12.7	17	45	10	24	11.3	14	62
3	138	43	25	46	32.6	64	123	20	63	30.4	80	123
4	130	65	27	44	11.1	94	49	17	59	20.8	102	53
5	183	71	36	46	43.4	16	40	15	30	7.8	13	43

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V
1	33	42	25	35	8.7	32	23	10	35	4.7	28	26
2	39	46	32	38	10.7	25	35	10	30	8.4	22	48
3	92	47	30	40	22.4	42	74	13	42	17.7	46	79
4	81	52	31	46	19.9	59	74	14	50	20.4	65	85
5	106	60	32	47	25.0	54	72	14	47	18.4	61	78

HEIGHT = 43.  
 VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 3:50:0  
 END TIME 3:55:0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2U	3D	U	V	W		
1	-177	205	61	274	137.8	-177	155	20	237	131.1	23	17	-190	183	265	133.7	22
2	-161	149	17	254	137.8	-160	131	20	208	128.4	24	16	-183	169	251	132.1	25
3	-188	104	52	234	115.1	-168	142	21	211	126.6	20	15	-192	147	243	127.6	17
4	-236	121	85	313	128.1	-203	175	36	272	129.8	27	13	-228	201	310	130.0	22
5	-236	169	50	298	124.7	-192	162	29	256	124.1	13	13	-216	190	296	129.9	23

CUMULATIVE MEANS

MIN	U	V	N	FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP		
				I	TH	U	V	W	SPEED	TH	2U	3D	U	V	W		SPEED	TH
1	-177	205	61	274	137.8	-177	155	20	237	131.1	23	17	-190	183	-18	265	133.7	22
2	-167	146	37	263	137.8	-168	142	20	222	129.7	24	16	-186	176	-14	258	132.8	24
3	-175	167	42	255	130.6	-168	136	20	218	128.7	22	16	-188	167	-18	253	131.2	22
4	-189	174	52	269	130.0	-176	145	24	231	129.0	24	15	-197	175	-21	267	130.9	22
5	-200	172	52	275	128.9	-180	144	25	237	129.0	21	15	-202	178	-22	273	130.7	22

ONE MINUTE STANDARD DEVIATIONS

MIN	PLANS			I. FOURIER COEFFICIENTS										I SINE WAVE FIT					TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH				
1	22	67	22	54	8.9	40	33	7	48	3.9	41	45	7	57	4.8				
2	22	66	24	47	12.4	17	34	12	37	4.9	27	45	6	47	5.5				
3	10	116	11	29	29.6	40	14	10	28	9.1	28	10	5	21	5.0				
4	48	79	42	43	15.3	19	57	12	34	10.6	26	73	10	46	12.3				
5	32	70	51	35	13.2	23	54	16	33	11.1	33	75	17	43	13.5				

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS							I, SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	22	67	22	54	8.9	40	33	7	48	3.9	41	45	7	57	4.8		
2	23	64	32	50	10.5	30	36	9	43	4.5	33	44	7	50	5.0		
3	21	42	27	45	20.9	32	31	9	39	6.2	31	39	8	43	5.5		
4	39	48	36	50	19.4	33	41	12	44	7.3	34	50	10	49	7.4		
5	42	43	34	44	18.2	31	44	13	42	8.0	34	55	12	49	8.8		

HEIGHT = 24.  
 VAD OT154 TIME IN GMT CT VAD 7/18/76 OTIS AIRFORCE HD 90.  
 START TIME 3:55: 0  
 END TIME 4: 0: 0

ONE MINUTE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT							
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-254	126	75	490	116.8	-226	101	27	250	114.1	20	20	-244	123	-23	275	116.7	22
2	-194	161	64	264	129.3	-174	133	22	229	126.5	22	20	-206	151	-18	263	125.9	26
3	-180	150	34	434	129.7	-157	133	17	210	130.7	19	17	-171	171	-15	246	134.5	19
4	-203	432	79	304	134.8	-181	187	36	267	133.8	23	16	-203	217	-28	311	135.9	27
5	-268	172	80	335	125.4	-213	141	39	275	118.5	25	21	-261	147	-29	333	117.6	30

CUMULATIVE MEANS

PEAKS	I						FOURIER COEFFICIENTS						I						SINE WAVE FIT					
	U	V	W	SPEED	TH		U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP					
1	-254	126	75	490	116.8		-226	101	27	250	114.1	20	20	-244	123	-23	275	116.7	22					
2	-227	143	70	478	122.6		-204	114	25	241	119.8	21	20	-226	136	-21	270	120.9	24					
3	-212	145	59	465	124.8		-169	121	22	231	123.2	21	19	-209	147	-19	262	125.2	22					
4	-209	168	64	277	128.6		-187	134	26	241	126.1	21	18	-207	166	-21	275	128.1	23					
5	-220	173	67	284	128.0		-192	137	24	247	124.6	22	19	-217	162	-23	286	126.1	25					

ONE MINUTE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				TH			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	46	44	44	24	12.1	29	30	11	27	7.0	17	24	15	14	5.4
2	50	66	21	12	18.1	33	45	16	15	13.9	33	57	8	12	14.1
3	31	30	11	17	9.7	37	17	14	20	10.3	37	38	8	19	11.5
4	14	38	14	35	4.7	19	75	14	43	15.5	46	91	17	28	18.8
5	40	61	10	30	11.5	31	115	23	48	27.6	31	156	25	24	24.7

CUMULATIVE STANDARD DEVIATIONS

PEAKS			I, FOURIER COEFFICIENTS										SINE WAVE FIT			
IN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	46	44	44	24	12.1	29	30	11	27	7.0	17	24	15	14	5.4	
2	56	56	38	25	15.9	39	40	13	24	12.1	31	43	12	14	11.0	
3	58	49	33	24	14.3	43	35	13	27	12.4	42	44	11	19	12.6	
4	46	60	31	34	13.9	34	54	15	35	13.8	42	66	13	31	14.9	
5	50	60	24	41	13.4	34	63	17	39	16.4	45	87	14	37	14.1	

START TIME 3:55: 0  
END TIME 4: 0: 0

MD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

OTIS4

VAD

HEIGHT = 43.

# ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-246	125	89	303	115.7	-203	125	19	244	121.9	26	23	-243	150	-27	291
2	-214	184	64	294	130.5	-184	153	21	244	129.7	20	14	-209	189	-24	288
3	-233	130	43	274	118.5	-186	125	17	226	123.5	15	23	-209	156	-17	264
4	-230	454	75	342	138.3	-191	204	36	285	136.8	23	14	-213	259	-31	337
5	-227	254	77	346	138.1	-184	224	31	298	140.6	18	15	-203	268	-28	346

# CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-246	125	89	303	115.7	-203	125	19	244	121.9	26	23	-243	150	-27	291
2	-240	154	76	299	123.1	-194	132	20	244	125.8	23	19	-226	169	-26	289
3	-234	145	64	289	121.4	-191	134	19	237	125.0	20	20	-220	164	-22	280
4	-236	174	67	304	125.5	-191	152	23	249	127.8	21	19	-218	187	-24	294
5	-234	190	69	313	128.2	-189	163	25	260	130.6	20	18	-215	205	-25	305

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	61	65	35	47	13.9	37	41	14	26	11.4	43	52	6	39	10.9
2	60	67	28	15	17.3	32	37	11	18	10.7	42	44	8	21	11.3
3	20	62	25	20	13.1	11	31	4	15	7.5	13	43	8	19	8.7
4	63	26	39	27	10.5	29	42	14	35	7.9	36	33	9	32	6.3
5	45	46	25	22	9.9	64	51	14	34	14.5	70	59	11	29	14.3

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	61	65	35	47	13.9	37	41	14	26	11.4	43	52	6	39	10.9
2	64	70	33	34	16.8	35	40	12	21	11.3	44	50	7	30	11.9
3	66	66	34	31	15.3	28	37	10	21	9.9	37	47	8	29	10.6
4	53	75	35	34	15.9	28	49	13	32	10.6	36	60	9	38	11.3
5	51	78	33	40	15.6	37	57	14	38	12.5	44	68	9	42	12.9

HEIGHT = 28. VAD OT154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HO 90. START TIME 4: 0: 0 END TIME 4: 5: 0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-222	193	74	296	130.7	-206	120	25	246	119.1	18	19	-233	148	-22	287	121.6	24
2	-223	192	65	298	130.6	-181	174	31	261	136.4	20	9	-192	222	-24	303	139.9	25
3	-261	143	34	304	118.9	-206	161	19	265	128.3	19	16	-234	190	-17	306	128.9	20
4	-271	173	64	329	122.2	-240	141	21	283	119.8	20	14	-267	168	-19	320	122.0	21
5	-240	203	56	322	130.5	-239	110	27	273	112.8	19	23	-266	128	-21	316	114.5	30

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP		
1	-222	193	74	276	130.7	-206	120	25	246	119.1	18	19	-233	148	-22	287	121.6	24
2	-222	192	69	297	130.7	-193	151	28	254	128.4	20	13	-211	188	-23	296	131.5	25
3	-235	177	54	299	126.9	-197	155	25	257	128.4	19	14	-218	189	-21	299	130.6	23
4	-244	176	59	307	125.7	-208	151	24	264	126.1	20	14	-231	183	-20	305	128.3	23
5	-244	180	59	310	126.4	-213	144	25	264	123.9	19	16	-237	174	-21	307	126.1	24

ONE MINUTE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	SP	U	V	W	TH	
1	30	42	44	38	6.6	31	65	25	39	14.7	33	42	23	
2	32	34	19	17	8.3	70	35	14	47	18.1	73	34	14	
3	41	47	14	19	11.2	38	23	8	25	8.2	31	49	8	
4	48	78	53	55	12.2	46	56	22	54	9.8	45	55	19	
5	59	50	32	24	13.0	28	80	24	38	17.8	24	122	15	

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	30	42	44	38	6.6	31	67	25	39	14.7	33	42	23	35	16.9
2	30	36	32	27	7.3	55	57	19	42	17.3	60	70	18	29	18.2
3	37	45	32	25	10.1	50	48	17	37	14.8	53	62	16	25	15.9
4	43	54	37	37	10.7	52	50	18	43	14.0	54	60	16	32	14.9
5	45	54	36	35	11.0	50	56	19	42	15.2	52	74	16	31	16.9

HEIGHT = 43.  
 START TIME 4: 0: 0  
 END TIME 4: 5: 0

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90.

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-222	244	41	333	137.8	-202	174	25	271	131.2	23	13	-236	229	-27	331	133.8	19
2	-172	239	18	321	145.1	-149	205	15	274	142.2	25	15	-176	255	-9	333	144.4	25
3	-259	207	51	341	128.4	-217	143	22	264	122.7	16	13	-265	177	-16	323	123.3	27
4	-267	169	50	332	122.7	-240	151	14	288	121.7	16	19	-264	181	-14	325	124.1	18
5	-265	213	58	348	129.2	-231	155	27	280	124.0	20	18	-263	207	-26	337	128.2	21

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS							SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-222	244	41	333	137.8	-202	174	25	271	131.2	23	13	-236	229	-27	331	133.8	19
2	-197	241	49	327	141.4	-176	192	20	273	136.7	24	14	-206	242	-18	332	139.1	22
3	-220	229	50	332	136.6	-191	174	21	273	131.5	21	14	-228	218	-17	329	133.3	24
4	-231	215	50	332	133.3	-203	168	19	274	129.2	20	15	-236	209	-16	328	131.1	23
5	-239	214	52	336	132.4	-209	165	21	275	128.0	20	16	-242	209	-18	330	130.4	22

ONE MINUTE STANDARD DEVIATIONS

PEAKS			I, FOURIER COEFFICIENTS					I SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	48	29	42	38	7.1	32	31	7	36	5.6	32	43	11	35	7.1
2	132	56	47	32	26.7	95	75	21	47	22.2	117	71	18	40	22.4
3	49	68	19	12	14.1	32	47	16	38	9.3	22	48	7	19	8.7
4	70	88	47	36	18.8	22	49	20	21	9.7	27	55	27	24	9.9
5	62	51	25	31	12.4	25	20	9	19	5.1	34	30	12	23	6.7

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURTH COEFFICIENTS				SINE WAVE FIT							
		I		TH		U		V		W		SPEED		TH	
MIN	U	V	X	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	48	29	42	34	7.1	32	31	7	36	5.6	32	43	11	35	7.1
2	48	43	54	34	19.0	73	57	16	40	16.5	87	58	17	35	16.8
3	84	54	43	24	18.1	64	57	16	34	15.6	75	62	14	30	16.1
4	85	67	43	30	14.9	60	55	17	35	14.4	68	61	17	28	15.2
5	81	63	40	30	17.6	55	50	15	32	13.4	63	56	17	27	13.7

HEIGHT = 28.  
START TIME 4: 5: 0  
END TIME 4:10: 0

MD 90.

OTIS AIRFORCE

7/14/76

CT VAD

TIME IN GMT

VAD OTIS

ONE MINUTE MEANS

FOURIER COEFFICIENTS

SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-268	216	73	350	127.9	-236	165	30	301	127.4	23	11	-249	215	-26	347
2	-231	205	64	317	131.4	-185	163	19	256	133.1	24	13	-203	214	-15	305
3	-145	452	23	345	152.3	-224	193	27	301	129.2	16	14	-248	233	-20	348
4	-234	216	63	360	127.2	-249	180	24	316	124.2	16	17	-277	215	-26	362
5	-235	181	74	351	121.0	-245	171	30	301	125.1	20	13	-269	206	-23	341

CUMULATIVE MEANS

SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-268	216	73	350	127.9	-236	165	30	301	127.4	23	11	-249	215	-26	347
2	-251	211	69	335	129.5	-212	164	25	280	130.0	23	12	-228	215	-21	327
3	-218	224	55	338	136.7	-216	173	25	287	129.8	21	13	-234	221	-20	334
4	-236	222	58	344	134.2	-225	175	26	295	128.3	20	14	-246	219	-22	341
5	-247	214	61	345	131.7	-229	174	27	296	127.7	20	14	-250	217	-22	341

ONE MINUTE STANDARD DEVIATIONS

SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	36	77	28	57	10.4	101	52	22	68	20.8	106	72	22	57	19.5	
2	59	65	31	49	14.0	81	32	15	47	17.6	73	49	12	39	15.1	
3	196	62	43	41	35.6	43	73	20	58	13.0	50	77	11	47	14.0	
4	33	37	19	27	6.7	37	81	24	52	14.9	28	97	16	38	16.6	
5	31	60	37	31	10.1	45	24	9	41	6.0	20	43	11	34	5.6	

CUMULATIVE STANDARD DEVIATIONS

SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	36	77	28	57	10.4	101	52	22	68	20.8	106	72	22	57	19.5	
2	50	69	28	54	11.8	93	42	19	61	18.8	92	60	18	52	17.2	
3	122	68	38	50	24.1	79	53	19	60	16.8	80	64	16	51	15.9	
4	109	61	33	45	21.2	71	60	20	58	15.2	72	72	16	48	16.0	
5	101	62	34	43	20.1	67	55	18	55	14.8	66	67	15	46	14.7	

HEIGHT = 43. VAD 0154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90. START TIME 4:5:0 END TIME 4:10:0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT								
PEAKS		I				I				I								
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-344	179	74	343	117.0	-253	151	33	298	120.4	34	20	-314	209	-28	380	123.4	25
2	-240	210	51	362	127.1	-228	173	23	290	127.7	18	15	-265	215	-17	348	129.4	21
3	-276	249	47	377	132.0	-214	181	24	296	130.0	26	15	-258	251	-17	363	134.3	24
4	-301	255	57	402	130.3	-254	201	24	326	128.3	17	19	-293	248	-27	385	130.2	23
5	-249	243	64	346	136.9	-242	163	19	294	123.3	25	22	-293	225	-20	375	127.2	22

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS					I					SINE WAVE FIT				
MIN	U	V	W	TH	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP					
1	-344	179	74	343	117.0	-253	151	33	298	120.4	34	20	-314	209	-28	380	123.4	25						
2	-314	194	64	377	122.1	-240	162	28	294	124.1	26	18	-290	212	-23	364	126.4	23						
3	-289	215	50	377	125.7	-232	169	26	291	126.3	26	17	-279	227	-21	364	129.3	24						
4	-299	225	58	383	125.8	-237	177	27	299	126.8	24	17	-282	232	-22	369	129.5	23						
5	-244	229	59	366	129.0	-238	173	25	298	126.0	24	14	-284	230	-22	370	129.0	23						

B-55

ONE MINUTE STANDARD DEVIATIONS

I, FOURIER COEFFICIENTS																	SINE WAVE FIT			
PEAKS																				

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS					SINE WAVE FIT				
PEAK	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH				
1	49	71	42	60	8.9	51	53	24	62	7.4	41	47	20	52	5.2				
2	68	71	32	49	13.2	50	40	20	47	8.7	53	43	18	42	8.8				
3	63	67	40	41	12.7	46	33	19	39	8.2	51	42	19	35	9.0				
4	54	64	35	32	12.3	43	35	14	39	7.7	47	39	17	34	8.1				
5	96	75	37	34	16.5	39	36	17	35	7.9	46	44	16	35	8.5				

START TIME 4:10:0  
END TIME 4:15:0

WD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

OTIS4

VAD

HEIGHT = 4M.

# ONE MINUTE MEANS

## SINE WAVE FIT

PEAKS		FOURIER COEFFICIENTS										I																		
MIN	U	V	W			SPEED			TH	U	V	W			SPEED			TH	20	30	U	V	W			SPEED			TH	SP
			1	2	3	1	2	3				1	2	3	1	2	3						1	2	3	1	2	3		
1	-220	447	33	369	141.7	-221	182	30	304	126.7	20	19	-244	208	-25	353	127.6	32												
2	-173	251	64	326	144.1	-153	224	26	241	145.1	26	10	-174	259	-19	320	145.5	24												
3	-172	244	46	492	142.4	-173	165	19	243	133.4	20	20	-197	203	-13	288	135.3	28												
4	-144	164	83	490	128.3	-190	140	24	248	123.2	26	20	-212	148	-20	282	122.9	28												
5	-145	172	36	468	143.0	-196	117	17	235	121.8	10	14	-207	139	-17	256	124.4	19												

# CUMULATIVE MEANS

## SINE WAVE FIT

MIN	U	V	PEAKS				I				FOURIER COEFFICIENTS				SINE WAVE FIT				SP
			W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	-220	247	33	369	141.7	-221	182	30	304	126.7	20	19	-244	208	-25	353	127.6	32	
2	-198	249	77	349	142.8	-189	202	28	294	135.2	23	15	-211	231	-22	338	135.9	29	
3	-189	240	66	329	142.7	-184	189	25	276	134.6	22	17	-207	221	-19	320	135.7	28	
4	-188	243	70	320	139.3	-185	178	25	269	132.0	23	18	-208	205	-19	312	132.8	28	
5	-179	212	63	309	140.1	-187	165	23	262	129.8	20	17	-208	191	-19	300	131.0	26	

# ONE MINUTE STANDARD DEVIATIONS

## SINE WAVE FIT

MIN	U	V	FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH
			W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	177	46	21	53	30.8	85	101	26	77	26.0	77	146	24	45	30.0
2	81	97	23	25	23.6	61	54	10	19	16.9	57	54	9	17	14.0
3	67	55	29	36	15.4	29	35	18	25	9.3	40	52	15	38	10.7
4	49	160	23	22	35.7	28	89	20	43	20.6	45	114	21	20	25.9
5	150	43	32	34	36.0	37	37	4	16	12.2	48	42	8	23	13.4

# CUMULATIVE STANDARD DEVIATIONS

## SINE WAVE FIT

MIN	U	V	FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH
			W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	177	46	21	53	30.8	85	101	26	77	26.0	77	146	24	45	30.0
2	134	72	24	47	26.6	80	83	19	57	23.4	75	112	18	38	24.9
3	117	66	24	51	22.8	66	71	19	54	17.3	64	95	17	44	20.7
4	104	48	28	49	26.3	59	76	19	52	17.8	59	102	18	43	22.1
5	114	71	31	50	28.0	55	74	17	49	14.8	57	96	16	45	20.7

HEIGHT = 43.  
 VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HQ 90.  
 START TIME 4:10:0  
 END TIME 4:15:0

ONE MINUTE MEANS

MIN	PLANKS			I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				SP					
	U	V	W		SPEED	TH	U	V		W	SPEED	TH							
1	-26.7	26.7	63	387	134.2	-234	-234	201	36	310	130.0	20	13	-283	255	-31	381	131.8	28
2	-25.1	25.1	66	345	135.9	-190	-190	184	19	276	134.4	28	16	-229	246	-21	344	136.9	24
3	-21.6	21.6	55	302	140.4	-193	-193	167	20	230	136.5	24	16	-182	231	-22	296	141.7	22
4	-19.1	19.1	51	304	143.5	-185	-185	145	14	230	130.7	35	24	-219	189	-21	305	131.3	23
5	-23.7	23.7	65	317	130.9	-175	-175	125	4	217	125.7	17	27	-229	171	-17	288	126.9	21

CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										I SINE WAVE FIT							
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-26.7	26.7	63	387	134.2	-234	201	36	310	130.0	20	13	-283	255	-31	381	131.8	28
2	-25.1	25.1	65	364	135.1	-210	194	27	292	132.4	24	15	-254	250	-26	361	134.5	26
3	-21.6	21.6	55	344	140.4	-193	185	25	272	133.7	24	15	-231	244	-24	341	136.8	25
4	-19.1	19.1	51	333	146.4	-187	174	22	261	132.9	27	17	-228	229	-23	331	135.3	24
5	-19.1	19.1	57	330	143.5	-185	165	19	253	131.5	25	19	-228	218	-22	323	133.7	24

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	51	79	34	54	11.5	31	31	51	6	51	5.9	36	42	8	52	2.8
2	53	52	33	28	11.6	49	49	55	9	19	14.8	56	58	10	23	12.7
3	52	27	26	30	9.6	27	27	32	13	39	4.3	28	18	4	22	5.0
4	180	47	51	34	37.3	44	44	37	7	19	13.6	71	85	13	41	18.6
5	41	47	31	61	13.2	33	33	14	5	12	4.0	39	25	9	39	5.1

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	51	79	34	54	11.5	31	31	51	6	51	5.9	36	42	8	52	2.8
2	53	64	32	46	11.1	46	46	51	11	40	11.3	54	49	10	42	9.5
3	73	55	34	51	13.2	48	48	47	12	48	9.7	57	42	9	48	8.9
4	123	52	37	50	23.5	47	47	44	12	46	10.7	60	60	10	48	12.1
5	117	55	36	54	22.7	44	44	47	13	47	10.2	56	60	10	49	11.6

HEIGHT = 48.

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90.

START TIME 4:15:0  
END TIME 4:20:0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-157	211	33	206	143.2	-151	125	16	215	124.0	20	25	-212	147	-3	289	123.1	33
2	-221	177	67	289	128.6	-193	122	24	236	121.7	27	14	-216	160	-19	280	125.8	29
3	-214	150	43	267	124.9	-196	112	14	227	119.6	23	14	-211	142	-9	256	123.7	21
4	-260	427	79	364	132.1	-201	242	26	330	139.8	26	14	-212	280	-21	369	142.7	38
5	-224	414	28	315	133.4	-211	157	25	269	126.1	15	12	-230	186	-20	301	129.0	20

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS										I				SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP				
1	-152	211	33	206	143.2	-151	125	16	215	124.0	20	25	-212	147	-3	289	123.1	33				
2	-189	194	50	267	135.9	-172	124	20	226	122.9	24	19	-214	153	-11	285	124.4	31				
3	-196	178	47	280	131.8	-181	119	18	226	121.7	23	17	-213	149	-11	274	124.1	27				
4	-212	189	55	300	131.9	-186	149	20	251	126.0	24	17	-213	181	-13	297	128.6	30				
5	-215	194	50	303	132.2	-190	150	21	255	126.0	22	16	-216	182	-14	298	128.7	28				

ONE MINUTE STANDARD DEVIATIONS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	74	85	37	49	23.7	42	103	8	65	28.9	51	134	17	22	29.4	
2	48	44	17	33	12.1	43	56	11	36	15.9	46	73	11	24	17.0	
3	36	55	19	20	13.6	18	20	5	18	5.0	14	28	9	19	5.8	
4	104	70	19	34	20.3	87	88	14	62	18.3	101	79	11	39	18.9	
5	51	50	9	21	12.9	36	55	14	29	13.1	41	43	7	19	10.9	

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH	
1	94	85	37	49	23.7	42	103	8	65	28.9	51	134	17	22	29.4	29.4	
2	81	68	32	40	19.5	46	82	10	51	22.3	46	103	16	22	22.9	22.9	
3	68	66	29	35	15.0	39	65	9	41	17.7	37	83	13	25	18.2	18.2	
4	42	69	24	50	18.1	53	88	11	64	19.2	56	98	13	50	19.7	19.7	
5	76	66	24	46	17.1	51	81	11	59	18.0	53	90	13	45	18.2	18.2	

VAD	OTIS	TIME IN GHT	CT	VAD	OTIS	AIRFORCE	HD
					9/16/76		

START TIME 4:15: 0  
END TIME 4:20: 0

## ONE MINUTE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS			I			SINE WAVE FIT			SP		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W		SPEED	TH
1	-124	254	51	334	143.2	-197	151	30	250	127.3	32	17	-235	196	-24	309	129.7	36
2	-219	204	47	509	133.6	-204	147	24	254	125.5	16	14	-222	184	-23	289	129.5	20
3	-235	123	26	469	117.3	-168	112	34	204	124.6	32	17	-215	152	-4	267	124.7	20
4	-319	226	67	385	126.1	-247	182	32	311	126.2	26	17	-282	234	-25	371	129.3	21
5	-236	416	31	329	133.5	-229	166	19	284	125.9	16	12	-248	211	-13	323	129.5	19

## CUMULATIVE MEANS

LINE	PEAKS			I			FOURIER COEFFICIENTS			I			SINE WAVE FIT			SP		
	U	V	N	SPEED	TH	U <sub>0</sub>	V	W	SPEED	TH	2D	3D	U	V	W		SPEED	TH
1	-1.74	259	51	334	143.2	-197	151	30	250	127.3	32	17	-235	196	-24	309	129.7	36
2	-2.09	230	49	321	135.0	-201	149	27	252	126.3	23	16	-228	190	-24	299	129.6	27
3	-2.17	196	41	304	131.5	-196	137	21	237	125.5	26	16	-224	178	-17	289	128.0	25
4	-2.22	204	48	326	130.0	-206	149	24	257	125.7	26	16	-240	193	-19	311	128.4	24
5	-2.41	207	45	327	130.7	-210	152	23	262	125.7	24	16	-241	195	-18	313	128.6	23

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS						I SINE WAVE FIT			TH
	U	V	W	U	TH	W	SPEED	TH	U	V	W	SPEED	
1	7.5	3.9	4.8	2.6	13.2	2.7	29	5.5	25	3.4	1.1	19	6.9
2	6.5	2.2	3.4	2.1	14.7	2.4	22	6.1	23	2.6	5	23	5.1
3	3.1	4.6	2.9	3.3	8.6	2.0	4	6.6	20	4.1	6	20	8.9
4	2.1	3.7	1.0	1.4	5.7	2.7	9	8.9	26	5.7	1.1	28	8.8
5	7.1	3.5	1.2	2.4	13.9	1.4	7	4.1	32	1.6	9	22	5.1

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS				I, SINE WAVE FIT				TH			
	U	V	$\lambda$	SPEED	TH	U	V	$\lambda$	SPEED	TH	U		V	$\lambda$	SPEED
1	7.3	3.9	4.3	2.4	13.2	2.6	2.7	7	29	5.5	25	3.4	11	19	6.9
2	6.6	5.7	3.4	3.3	14.3	2.3	2.7	6	25	5.7	24	2.9	8	23	5.7
3	5.8	7.3	3.4	4.2	16.0	2.8	3.0	11	33	5.9	23	3.7	12	26	7.0
4	6.5	6.6	3.1	5.2	14.0	3.7	3.4	11	44	6.7	35	4.9	12	46	7.4
5	6.5	6.1	2.9	4.4	13.9	3.6	3.5	11	42	6.2	34	4.5	12	42	7.0

HEIGHT = 28. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 4:20:0  
END TIME 4:25:0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-258	89	42	279	108.0	-234	106	20	259	114.2	8	11	-243	119	-17	273	115.9	17	
2	-247	165	46	340	119.5	-241	147	20	295	123.8	19	15	-254	190	-19	333	127.7	27	
3	-247	183	35	318	125.4	-217	152	24	281	124.4	20	12	-236	188	-14	320	127.1	23	
4	-222	113	25	293	119.9	-252	76	15	266	106.6	10	15	-268	97	-13	288	110.0	18	
5	-253	144	27	296	120.2	-248	84	16	267	109.4	15	14	-267	112	-13	293	113.4	20	

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-258	89	42	279	108.0	-234	106	20	259	114.2	8	11	-243	119	-17	273	115.9	17	
2	-274	130	55	312	114.2	-238	128	20	279	119.4	14	13	-249	158	-18	305	122.3	22	
3	-266	147	44	314	117.7	-231	136	21	279	121.0	16	13	-245	167	-17	310	123.8	23	
4	-254	137	42	308	118.3	-237	120	19	276	117.1	14	14	-251	148	-16	304	120.1	21	
5	-254	139	39	306	118.7	-239	113	19	274	115.7	15	14	-254	141	-15	302	118.8	21	

B-60

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	22	65	23	36	11.6	28	31	9	30	6.4	28	33	8	31	6.2				
2	54	78	35	54	12.3	99	44	18	63	21.1	102	62	14	56	19.6				
3	50	85	36	50	15.5	64	86	18	46	20.2	68	106	18	53	20.8				
4	138	94	25	19	36.3	28	38	9	28	8.2	24	36	9	20	7.6				
5	52	43	27	38	10.5	43	41	13	31	10.9	45	31	11	33	8.7				

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	22	65	23	36	11.6	28	31	9	30	6.4	28	33	8	31	6.2				
2	42	80	31	55	13.0	72	45	14	52	16.3	75	61	11	54	15.7				
3	45	83	33	52	14.4	69	59	15	49	17.2	71	76	13	53	17.0				
4	40	85	32	46	21.6	61	60	14	44	16.5	62	74	12	47	16.2				
5	75	79	32	44	19.4	58	54	13	42	15.7	59	69	12	44	15.2				

HEIGHT = 43.  
 VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HQ 90.  
 START TIME 4:20:0  
 END TIME 4:25:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2U	3D	U	V	W	SPEED	
1	-246	144	34	289	120.3	-208	117	13	244	119.1	17	23	-237	139	-12	285	120.3
2	-289	183	74	356	123.4	-228	168	27	248	125.9	29	13	-262	213	-21	344	128.9
3	-251	194	38	329	127.5	-211	141	24	267	123.2	21	11	-243	178	-18	315	125.8
4	-164	148	34	296	137.0	-229	93	12	249	112.0	22	20	-267	121	-13	297	119.1
5	-279	107	39	304	110.9	-228	112	19	256	116.4	20	16	-267	149	-15	307	119.1

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		
1	-246	144	34	289	120.3	-208	117	13	244	119.1	17	23	-237	139	-12	285	23	
2	-266	162	54	320	121.7	-217	140	20	264	122.2	23	18	-248	173	-16	312	24	
3	-261	172	49	323	123.7	-215	141	21	265	122.6	22	16	-246	175	-17	313	24	
4	-238	167	45	317	126.8	-218	130	19	262	120.1	22	17	-251	162	-16	309	24	
5	-246	156	44	314	123.8	-220	126	19	260	119.4	22	17	-254	160	-16	309	23	

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	38	46	35	35	9.6	35	48	9	33	12.0	41	75	8	31	16.2
2	96	85	51	76	15.8	51	56	15	54	10.1	70	62	15	62	11.4
3	68	79	34	39	17.2	44	60	12	24	19.0	53	85	10	24	17.9
4	190	108	35	33	49.4	16	23	8	18	4.6	23	42	9	27	7.6
5	26	53	22	28	9.5	38	14	11	35	5.3	23	18	9	20	4.1

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	38	46	35	35	9.6	35	48	9	33	12.0	41	75	8	31	16.2
2	71	67	47	65	12.4	42	56	14	48	11.3	55	77	12	55	14.3
3	67	71	43	56	14.1	42	63	13	40	13.9	53	78	11	46	15.2
4	112	79	41	52	25.9	38	60	12	37	13.2	48	74	11	42	14.4
5	102	74	38	49	24.4	37	55	12	36	12.1	45	67	10	39	13.1

HEIGHT = 43.  
 VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90.  
 START TIME 4:25:0  
 END TIME 4:30:0

ONE MINUTE MEANS

FOURIER COEFFICIENTS																	I SINE WAVE FIT			
PEAKS				I				FOURTH COEFFICIENTS				I				SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		
1	-259	164	61	317	122.0	-256	111	21	281	113.6	21	16	-275	145	-21	314	118.0	20		
2	-263	137	40	312	117.2	-248	89	10	268	109.1	15	21	-281	111	-12	306	111.3	20		
3	-278	184	51	357	121.0	-240	142	32	294	118.5	18	13	-299	176	-25	351	120.6	18		
4	-255	214	38	343	130.0	-260	156	28	305	121.0	11	9	-283	187	-22	341	123.6	21		
5	-314	214	32	387	124.3	-294	165	22	338	119.1	12	9	-315	204	-15	377	122.8	18		

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS							I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-259	164	61	317	122.0	-256	111	21	281	113.6	21	16	-275	145	-21	314	118.0	20
2	-261	151	51	314	119.7	-252	101	16	275	111.5	18	18	-278	129	-17	311	114.9	20
3	-273	162	51	324	120.2	-255	114	21	282	113.7	18	17	-285	145	-19	323	116.7	19
4	-266	174	48	331	122.5	-256	124	23	288	115.5	16	15	-284	155	-20	328	118.3	20
5	-277	182	45	342	122.9	-263	132	23	297	116.2	15	14	-290	165	-19	337	119.2	19

ONE MINUTE STANDARD DEVIATIONS

PEAKS										I, FOURIER COEFFICIENTS					I SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH				
1	42	78	40	30	15.0	25	18	12	21	4.6	37	33	9	28	7.6				
2	47	49	9	41	18.5	31	55	14	39	10.1	30	53	7	36	9.0				
3	33	71	19	36	11.6	27	22	10	25	4.7	25	38	6	30	5.6				
4	58	70	23	23	14.7	29	18	10	25	4.3	31	18	9	22	4.8				
5	54	57	21	28	10.9	18	21	6	23	2.7	19	27	5	26	3.1				

CUMULATIVE STANDARD DEVIATIONS

NEARS										FOURIER COEFFICIENTS					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH				
1	42	78	40	30	15.0	25	18	17	21	4.6	37	33	9	28	7.6									
2	46	46	31	34	16.2	27	39	14	30	7.7	33	45	9	31	8.6									
3	42	81	27	37	14.6	27	34	15	30	7.5	31	48	9	35	8.1									
4	46	40	26	36	14.9	27	40	14	30	7.5	31	46	9	33	7.9									
5	50	77	26	41	14.1	29	40	13	35	7.0	31	47	8	37	7.4									

HEIGHT = 28. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MU 90. START TIME 4:25: 0 END TIME 4:30: 0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-260	125	47	300	115.9	-238	85	17	256	109.1	21	19	-262	107	-10	289
2	-253	139	33	293	118.1	-240	114	14	270	115.9	16	8	-253	146	-11	294
3	-316	155	41	359	117.2	-277	141	21	314	116.5	16	14	-302	179	-18	353
4	-279	154	41	323	118.3	-233	126	18	247	118.4	17	13	-272	156	-14	315
5	-230	401	31	325	130.0	-199	175	28	288	133.8	22	22	-223	224	-14	342

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-260	125	47	300	115.9	-238	85	17	256	109.1	21	19	-262	107	-10	289
2	-256	133	39	496	117.1	-239	103	14	263	112.8	18	13	-257	126	-11	292
3	-275	143	40	316	117.1	-251	115	18	279	113.9	18	13	-271	144	-13	311
4	-276	145	40	318	117.4	-247	117	18	277	114.9	17	13	-271	146	-13	312
5	-263	159	39	320	120.5	-235	132	20	280	119.6	19	15	-259	166	-13	319

B-63

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	42	81	30	27	16.8	21	39	17	25	8.7	36	58	12	36	12.3
2	39	57	17	48	10.4	35	36	8	39	6.9	29	38	6	36	6.2
3	37	40	24	43	5.7	38	49	15	47	7.4	32	40	11	32	6.5
4	49	55	47	41	11.3	31	23	19	32	4.6	38	14	13	31	4.5
5	43	43	29	61	21.3	113	63	14	49	27.0	138	60	8	52	27.7

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	42	81	30	27	16.8	21	39	17	25	8.7	36	58	12	36	12.3
2	39	66	24	38	13.2	28	40	13	33	8.7	31	50	9	34	10.0
3	47	60	23	49	11.2	35	45	13	44	8.0	37	52	10	44	9.1
4	46	58	28	46	11.0	35	42	14	41	7.5	37	47	10	41	8.3
5	63	71	24	50	14.9	65	53	15	43	16.6	76	68	10	45	17.6

HEIGHT = 28.

VAD OTIS

TIME IN GMT CT VAD

9/18/76 OTIS AIRFORCE

HD 90.

START TIME 4:30:0  
END TIME 4:35:0

# ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-331	125	67	359	110.1	-263	147	23	306	119.2	22	12	-285	175	-18	340	121.4	33	
2	-184	154	46	309	138.3	-224	134	26	276	124.9	24	10	-235	176	-18	312	128.8	23	
3	-273	188	51	338	124.2	-250	160	26	299	121.9	20	14	-272	195	-26	337	125.2	21	
4	-247	415	43	335	131.2	-235	147	32	279	122.0	25	21	-266	209	-14	340	127.9	24	
5	-292	184	60	347	122.3	-257	177	29	316	124.6	13	11	-271	205	-23	342	126.9	20	

## CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-331	125	67	359	110.1	-263	147	23	306	119.2	22	12	-285	175	-18	340	121.4	33	
2	-257	144	54	334	124.2	-244	144	24	291	122.0	23	11	-260	176	-18	326	125.1	28	
3	-263	157	56	335	124.2	-246	147	25	294	122.0	22	12	-264	182	-21	330	125.1	26	
4	-259	172	52	335	125.9	-243	147	27	290	122.0	23	14	-264	189	-19	332	125.8	25	
5	-260	175	54	337	125.1	-246	155	27	296	122.6	21	13	-266	193	-20	335	126.1	24	

## ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	39	65	25	45	9.2	38	47	8	40	8.6	46	55	8	39	10.1				
2	204	47	46	31	46.6	98	33	18	52	22.3	109	50	19	35	23.2				
3	36	56	32	41	9.0	35	50	13	52	5.4	23	49	12	41	5.7				
4	60	59	29	42	12.7	40	32	9	42	5.9	29	36	5	40	3.5				
5	34	45	20	43	5.4	20	31	7	17	6.0	24	31	5	20	5.8				

## CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	39	65	25	48	9.2	38	47	8	40	8.6	46	55	8	39	10.1				
2	180	57	37	47	35.2	74	34	13	47	16.4	84	50	14	38	17.5				
3	130	60	35	44	28.7	62	42	13	47	13.5	69	49	13	38	14.4				
4	116	63	33	42	25.6	57	39	12	45	11.9	61	47	12	34	12.6				
5	103	57	31	39	22.6	51	34	11	42	10.8	54	44	11	35	11.3				

START TIME 4:30:0  
END TIME 4:35:0

MO 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

OTIS4

VAD

HEIGHT = 43.

# ONE MINUTE MEANS

MIN	U	V	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
			W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-297	152	65	357	116.7	-278	103	19	304	109.6	16	20	-307	120	-15	344	111.1	28
2	-262	172	56	330	125.8	-255	134	31	290	117.3	16	11	-282	173	-24	334	121.2	21
3	-263	193	56	335	127.0	-244	151	28	291	122.5	13	16	-273	199	-28	343	126.1	23
4	-254	249	33	365	134.4	-249	190	26	315	127.2	12	10	-272	227	-18	356	129.7	21
5	-291	208	43	368	124.7	-241	173	24	300	125.4	22	14	-281	217	-16	358	127.3	24

# CUMULATIVE MEANS

MIN	U	V	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
			W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-297	152	65	357	116.7	-278	103	19	304	109.6	16	20	-307	120	-15	344	111.1	28
2	-274	140	59	340	123.3	-259	130	26	295	116.5	15	16	-287	165	-23	340	119.5	24
3	-264	178	52	347	126.3	-256	146	26	300	119.4	14	14	-283	182	-21	344	122.3	23
5	-273	149	50	351	126.0	-253	151	26	300	120.5	15	14	-283	188	-20	347	123.2	23

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
			W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	TH
1	54	122	15	25	21.9	32	72	15	32	14.0	41	98	14	23	18.0			
2	28	55	34	24	10.0	20	33	8	28	5.0	15	39	8	25	5.7			
3	67	60	24	37	13.6	50	24	7	33	8.9	47	50	11	32	9.8			
4	69	65	27	40	13.4	36	35	10	42	4.8	37	36	8	44	4.3			
5	68	81	28	36	15.8	35	40	22	36	7.6	17	46	12	25	6.6			

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
			W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	TH
1	54	122	15	25	21.9	32	72	15	32	14.0	41	98	14	23	18.0			
2	43	90	26	27	16.5	27	54	13	30	10.5	31	75	11	24	13.4			
3	51	81	25	30	15.5	36	44	11	30	10.6	37	71	12	26	12.9			
4	56	84	28	34	15.5	36	52	11	34	10.5	37	69	11	32	12.1			
5	59	80	27	35	15.3	35	51	13	34	10.2	34	66	11	31	11.3			

MEIGBT

min					
1				-2	
2				-2	
3				-3	
4				-2	
5				-1	

1	-2
4	-2
3	-2
4	-2
5	-2

Year	1	2	3	4	5
1970	10	15	20	25	30
1971	12	18	23	28	33
1972	14	20	25	30	35
1973	16	22	27	32	37
1974	18	24	29	34	39
1975	20	26	31	36	41
1976	22	28	33	38	43
1977	24	30	35	40	45
1978	26	32	37	42	47
1979	28	34	39	44	49
1980	30	36	41	46	51
1981	32	38	43	48	53
1982	34	40	45	50	55
1983	36	42	47	52	57
1984	38	44	49	54	59
1985	40	46	51	56	61
1986	42	48	53	58	63
1987	44	50	55	60	65
1988	46	52	57	62	67
1989	48	54	59	64	69
1990	50	56	61	66	71
1991	52	58	63	68	73
1992	54	60	65	70	75
1993	56	62	67	72	77
1994	58	64	69	74	79
1995	60	66	71	76	81
1996	62	68	73	78	83
1997	64	70	75	80	85
1998	66	72	77	82	87
1999	68	74	79	84	89
2000	70	76	81	86	91
2001	72	78	83	88	93
2002	74	80	85	90	95
2003	76	82	87	92	97
2004	78	84	89	94	99
2005	80	86	91	96	101
2006	82	88	93	98	103
2007	84	90	95	100	105
2008	86	92	97	102	107
2009	88	94	99	104	109
2010	90	96	101	106	111
2011	92	98	103	108	113
2012	94	100	105	110	115
2013	96	102	107	112	117
2014	98	104	109	114	119
2015	100	106	111	116	121
2016	102	108	113	118	123
2017	104	110	115	120	125
2018	106	112	117	122	127
2019	108	114	119	124	129
2020	110	116	121	126	131
2021	112	118	123	128	133
2022	114	120	125	130	135
2023	116	122	127	132	137
2024	118	124	129	134	139
2025	120	126	131	136	141
2026	122	128	133	138	143
2027	124	130	135	140	145
2028	126	132	137	142	147
2029	128	134	139	144	149
2030	130	136	141	146	151
2031	132	138	143	148	153
2032	134	140	145	150	155
2033	136	142	147	152	157
2034	138	144	149	154	159
2035	140	146	151	156	161
2036	142	148	153	158	163
2037	144	150	155	160	165
2038					

1	2	3	4	5
---	---	---	---	---

10

10

100

100

U  
I  
.  
e  
=

U  
I  
.  
e  
=

HEIGHT = 40.  
 VAD 0154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HL 90.  
 START TIME 4:40:0  
 END TIME 4:45:0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP
1	-234	219	15	327	132.9	-218	165	15	276	126.3	22	13	-240	205	-3	319	130.1	21											
2	-285	188	69	349	123.2	-253	191	26	319	126.9	12	9	-273	218	-20	352	128.4	26											
3	-266	226	53	356	130.4	-239	183	24	334	127.9	22	18	-275	231	-18	363	130.1	26											
4	-295	196	43	405	122.3	-248	210	22	359	126.1	12	11	-308	244	-17	395	128.4	31											
5	-317	252	35	412	128.2	-304	226	41	380	126.6	10	7	-317	254	-36	407	128.6	22											

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP
1	-234	219	15	327	132.9	-218	165	15	276	126.3	22	13	-240	205	-3	319	130.1	21											
2	-259	204	42	338	128.1	-235	174	21	298	126.6	17	11	-256	212	-12	336	129.2	24											
3	-262	212	46	345	128.9	-237	180	22	300	127.1	19	14	-263	219	-14	346	129.6	24											
4	-270	204	45	359	127.4	-249	187	22	314	126.9	17	13	-274	225	-15	358	129.3	26											
5	-274	216	53	369	127.5	-260	195	26	327	126.6	16	12	-282	230	-19	367	129.2	25											

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP
1	48	55	22	25	11.9	26	51	9	43	7.5	23	48	8	26	8.3														
2	48	65	19	30	12.7	31	35	14	32	6.4	33	41	15	31	7.2														
3	55	53	18	26	11.3	54	24	11	45	7.1	45	33	8	24	7.9														
4	68	431	28	53	32.7	41	30	11	40	5.1	45	37	10	46	5.3														
5	42	75	21	26	11.5	23	16	13	17	3.3	23	20	14	20	3.2														

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	U	V	W	TH	SP
1	48	55	22	25	11.9	26	51	9	43	7.5	23	48	8	26	8.3														
2	48	59	41	29	12.8	33	44	12	42	6.9	32	43	14	32	7.5														
3	52	57	34	29	12.0	41	37	12	42	6.6	37	40	12	32	7.4														
4	62	109	32	43	18.4	46	37	11	48	6.3	43	40	12	41	6.9														
5	61	100	34	45	17.1	47	37	14	51	5.8	43	38	15	42	6.3														

HEIGHT = 43.

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.

START TIME 4:40:0  
END TIME 4:45:0

# ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										I			SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH				
1	-263	297	26	376	134.1	-235	195	174	29	309	129.6	16	14	-268	246	-3	368	132.6	24		
2	-270	275	45	375	128.4	-246	174	29	306	125.8	24	16	16	-262	222	-28	361	128.4	21		
3	-213	250	40	355	135.7	-227	203	22	316	131.7	17	11	11	-249	249	-15	354	134.9	22		
4	-331	231	39	333	125.2	-254	161	1	315	124.2	31	27	27	-317	253	-9	424	129.1	43		
5	-262	294	43	400	134.6	-175	204	12	326	136.5	26	26	26	-202	262	-14	409	139.9	38		

# CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS						I	SINE WAVE FIT										
	U	V	W	SPEED	TH	U		V	W	SPEED	TH	SP						
1	-263	297	26	376	134.1	-235	195	14	309	129.6	16	14	-268	246	-3	368	132.6	24
2	-278	235	47	376	131.0	-241	146	20	307	127.5	20	15	-275	233	-16	364	130.3	22
3	-269	240	45	369	132.8	-237	191	20	307	128.6	19	14	-267	238	-16	361	131.8	22
4	-282	236	43	366	130.8	-241	183	15	309	127.6	22	17	-281	242	-14	378	131.1	28
5	-274	246	43	389	132.2	-229	184	14	312	129.3	23	19	-266	246	-14	384	132.7	30

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	103	70	40	44	17.3	38	34	5	30	7.4	53	42	11	38	8.6	
2	74	45	15	40	11.9	30	30	17	29	5.7	49	34	13	41	6.9	
3	70	76	21	29	16.6	21	21	10	23	3.4	22	23	8	26	3.1	
4	91	148	42	44	22.3	93	62	13	53	18.0	100	91	12	30	17.9	
5	64	44	37	25	10.2	163	127	27	68	33.7	232	139	15	70	36.9	

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	103	70	40	44	17.3	38	34	5	30	7.4	53	42	11	38	8.6	
2	46	56	35	42	14.3	33	31	16	28	6.5	49	34	14	38	7.7	
3	42	61	31	39	14.4	30	24	14	26	6.0	43	34	15	34	6.8	
4	88	47	33	47	17.0	53	41	16	34	10.4	65	54	14	43	10.6	
5	84	65	33	46	16.1	85	64	19	42	16.8	114	74	14	49	17.9	

HEIGHT = 26.

VAD OT154

TIME IN GMT CT VAD

9/18/76

OT15 AIRFORCE

HQ 90.

START TIME 4:45:0  
END TIME 4:50:0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-26.9	41.6	3.4	35.1	128.6	-212	167	13	294	133.2	16	20	-241	227	134.1	34
2	-26.5	43.9	6.7	36.7	132.4	-232	200	46	308	130.9	20	16	-266	254	133.6	23
3	-25.3	45.8	4.7	36.2	135.3	-243	191	27	312	128.2	19	13	-264	230	131.0	22
4	-25.6	41.6	6.3	34.9	129.7	-257	164	24	311	123.3	15	13	-276	204	126.5	25
5	-24.6	42.5	6.3	34.6	139.0	-215	234	25	327	137.5	20	14	-245	275	138.3	29

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-26.9	41.6	3.4	35.1	128.6	-212	167	13	294	133.2	16	20	-241	227	134.1	34
2	-26.7	42.6	4.4	35.4	130.4	-221	191	28	301	132.1	18	18	-253	239	133.9	29
3	-26.7	43.7	4.6	36.0	132.1	-229	192	28	305	130.8	18	16	-257	236	132.9	27
4	-26.1	43.4	5.1	35.7	131.5	-235	187	27	306	129.0	18	15	-261	229	131.4	26
5	-25.6	42.4	5.3	36.4	132.9	-231	195	27	310	130.6	18	15	-258	237	132.7	27

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	4.6	5.4	3.0	2.7	10.6	8.8	3.6	1.3	4.6	17.3	8.5	4.2	9	25	16.0
2	7.6	6.0	3.1	3.0	14.5	3.8	2.7	9	25	6.7	3.3	3.2	11	21	6.4
3	3.0	3.2	2.5	3.2	6.1	3.1	3.2	1.6	14	7.9	3.3	2.8	19	24	6.0
4	6.7	4.6	1.8	4.7	16.7	5.6	4.3	1.8	55	8.9	4.8	4.7	11	41	8.9
5	6.0	10.0	5.1	5.2	15.6	6.2	5.5	2.1	24	13.8	7.0	6.1	16	34	13.1

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	4.6	5.4	3.0	2.7	10.6	8.8	3.6	1.3	4.6	17.3	8.5	4.2	9	25	16.0
2	5.9	5.6	3.6	2.9	12.2	6.8	3.0	2.1	37	13.1	6.5	3.9	12	27	12.1
3	5.2	5.0	3.2	3.0	10.5	5.7	3.0	1.7	31	11.4	5.5	3.5	14	26	10.3
4	5.5	5.4	2.4	3.4	11.9	5.7	3.5	1.8	37	11.2	5.3	4.0	14	29	10.2
5	5.4	7.1	3.3	4.0	12.7	5.8	4.4	1.9	35	12.0	5.6	4.7	14	31	10.9

START TIME 4:45:0  
END TIME 4:50:0

HL 90.

OTIS AIRFORCE

9/14/76

CT VAD

TIME IN GHT

OTIS4

VAD

MELOM = 43.

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT							
	U	V	W	SP	TH	U	V	W	TH	2D	3D	U	V	W	SP	
1	-231	407	40	368	139.0	-205	204	25	292	135.3	18	14	-244	255	-14	355
2	-271	453	68	383	132.7	-248	220	30	333	131.6	16	8	-274	258	-22	379
3	-240	400	41	383	137.4	-233	211	17	316	132.3	19	13	-264	248	-15	364
4	-296	438	69	417	124.9	-262	134	20	305	116.8	36	24	-319	183	-18	388
5	-230	340	67	430	146.6	-225	261	26	351	139.2	19	9	-249	331	-15	423

CUMULATIVE MEANS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT							
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SPEED	TH	SP		
1	-231	407	40	368	139.0	-205	204	25	292	135.3	18	14	-244	255	-14	355	136.3	29
2	-253	459	48	376	135.6	-228	213	27	314	133.3	17	11	-260	256	-18	368	134.7	25
3	-251	462	46	378	136.2	-230	212	24	315	133.0	17	11	-262	254	-17	367	134.2	24
4	-262	458	50	386	134.4	-237	194	23	312	129.1	22	14	-275	237	-17	372	130.5	29
5	-256	274	52	395	136.8	-235	207	24	320	131.0	21	14	-270	255	-17	382	132.9	29

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				
	U	V	W	TH	U	V	W	TH	U	V	W	TH	
1	81	83	42	34	18.0	47	18	9	38	6.8	38	19	6
2	74	79	24	42	15.2	35	24	10	25	5.9	39	28	11
3	106	77	34	21	19.9	38	19	15	34	4.7	33	21	16
4	88	132	24	36	22.0	33	74	12	34	14.9	63	124	16
5	132	64	40	47	19.3	63	46	19	36	11.6	78	55	15

CUMULATIVE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT				
	U	V	W	TH	U	V	W	TH	U	V	W	TH	SPEED		
1	81	83	42	34	18.0	47	18	9	38	6.8	38	19	6	23	5.7
2	77	76	33	38	16.2	45	22	9	37	6.4	40	23	10	27	5.8
3	88	75	37	33	16.9	42	21	12	35	5.8	37	22	12	28	5.2
4	88	84	31	36	18.0	42	52	12	34	11.0	50	47	12	30	12.2
5	94	41	32	41	18.6	45	57	13	37	11.7	56	75	13	36	12.9

START TIME 4:50:0  
END TIME 4:55:0

HD 90.

OTIS AIRFORCE

4/18/76

CT VAO

TIME IN GWT

OTIS

VAO

MEJLH =

# ONE MINUTE MEANS

PEAKS	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP				
1	-1.0	2.7	5.1	4.5	145.9	-255	24	363	135.2	23	20	-291	320	-34	437	137.6	35
2	-3.2	2.8	4.8	4.6	132.1	-269	29	364	131.8	27	14	-298	296	-37	422	134.6	30
3	-2.0	3.1	5.6	4.6	153.2	-144	21	368	156.9	21	17	-156	397	-12	445	159.0	45
4	-2.6	3.1	6.6	4.5	142.3	-163	32	333	151.7	24	16	-193	337	-21	406	151.6	38
5	-1.3	3.0	4.5	4.7	150.8	-138	29	336	155.0	18	6	-151	348	-23	387	156.2	29

## CUMULATIVE MEANS

PEAKS	I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-1.0	2.7	5.1	145.9	-255	24	363	135.2	23	20	-291	320	-34	437	137.6	35	
2	-2.6	2.8	4.8	139.0	-262	24	364	133.5	25	17	-294	308	-33	430	136.1	33	
3	-2.3	3.2	5.6	143.8	-123	26	365	141.3	24	17	-248	338	-26	435	143.7	37	
4	-2.7	3.2	7.4	143.3	-206	27	356	144.2	24	17	-233	338	-24	427	145.9	37	
5	-2.3	3.1	7.0	144.8	-193	27	352	146.3	23	15	-217	340	-24	419	147.9	36	

## ONE MINUTE STANDARD DEVIATIONS

I. FOURIER COEFFICIENTS														I				SINE WAVE FIT			
PEAKS	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH					
1	2.19	2.14	7.1	6.1	45.5	71	60	83	6.8	71	79	35	84	9.2							
2	4.0	4.7	6.1	4.1	6.5	59	34	32	7.4	45	65	28	63	4.5							
3	6.0	4.7	3.7	3.0	8.4	122	52	19	40	21.6	36	20	16	14.8							
4	6.2	5.3	3.1	3.3	10.1	106	64	28	77	20.5	44	16	46	19.7							
5	9.0	3.9	3.7	1.0	8.4	62	43	19	18	12.9	50	17	12	12.6							

## CUMULATIVE STANDARD DEVIATIONS

PEAKS	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP
1	2.19	4.19	7.1	45.5	71	60	83	6.8	71	79	35	84	9.2
2	1.78	1.96	4.2	31.8	63	44	28	6.6	57	66	30	71	7.1
3	1.46	1.36	3.1	26.9	101	54	25	57	17.3	110	71	59	16.1
4	1.22	1.10	2.2	23.2	105	52	26	64	18.4	114	64	25	56
5	1.12	1.06	3.0	21.2	101	57	24	58	17.8	111	61	24	53

MEI 001 = 9.3.4  
 VAR OTIS+ TIME IN GPT CT VAD 9/16/76 OTIS AIRFORCE HD 90.  
 START TIME 4:50:0  
 END TIME 4:55:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-319	301	116	449	131.1	-235	182	18	304	128.0	36	31	-303	299	-30	432	133.8	37
2	-251	449	76	512	150.4	-232	292	48	378	141.8	24	14	-306	390	-30	501	141.5	38
3	-249	453	65	522	150.8	-273	321	38	426	138.8	20	16	-300	403	-25	506	142.7	43
4	-249	376	77	453	146.2	-168	321	38	371	153.4	23	18	-202	380	-22	440	153.0	34
5	-216	414	62	475	152.1	-130	315	24	356	158.8	25	22	-153	402	-16	446	160.3	47

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-319	301	116	449	131.1	-235	182	1A	304	128.0	36	31	-303	299	-30	432	133.8	37
2	-285	375	97	483	140.7	-233	237	33	341	134.9	30	22	-304	344	-30	467	137.7	38
3	-272	404	85	492	144.5	-248	268	35	372	136.3	26	20	-303	366	-28	481	139.5	39
4	-266	397	83	487	144.9	-229	281	36	372	140.4	26	19	-278	369	-26	471	142.8	38
5	-257	400	79	484	146.3	-210	284	33	369	144.0	25	20	-254	376	-24	466	146.2	40

B-73

ONE MINUTE STANDARD DEVIATIONS

MIN	I. FOURIER COEFFICIENTS										SINE WAVE FIT				
	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP		
1	78	126	33	110	15.0	73	56	25	64	12.8	74	93	21	90	10.8
2	38	67	46	54	6.4	70	59	25	68	10.3	62	79	23	65	9.3
3	57	59	38	37	8.0	30	74	30	55	8.8	28	73	16	48	7.2
4	27	41	30	32	4.7	90	49	25	60	14.3	105	33	16	47	14.0
5	76	72	40	55	11.5	109	64	27	61	19.5	124	59	13	55	17.8

CUMULATIVE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT				
	U	V	W	TH	U	V	W	TH	U	V	W	TH			
1	78	126	33	110	15.0	73	56	25	64	12.8	74	93	21	90	10.8
2	69	124	54	90	14.9	68	79	29	74	13.2	65	95	21	83	10.4
3	65	109	50	76	13.5	59	87	28	78	11.7	54	90	19	73	9.5
4	59	97	45	70	11.9	75	82	27	73	14.1	80	80	18	69	12.0
5	65	97	45	67	12.0	90	79	27	70	16.7	101	76	17	67	14.7

HEIGHT = 28.

VAD OT154

TIME IN GMT CT VAD

9/18/76

OTIS AIRFORCE

HD 90.

START TIME 4:55:0

END TIME 5:01:0

# ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-188	258	38	374	138.6	-193	207	20	322	137.6	20	14	-207	261	-11	376	141.2	35
2	-271	348	67	447	141.9	-227	276	23	365	140.1	20	14	-268	343	-20	442	141.6	27
3	-313	217	42	397	124.5	-275	217	15	354	128.0	14	11	-296	249	-13	391	129.9	25
4	-304	271	57	417	132.0	-275	173	14	337	121.0	26	21	-331	213	-12	406	122.0	36
5	-274	278	41	404	134.3	-267	164	20	332	119.6	14	15	-303	197	-11	382	122.0	38

# CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT									
	I					J					I					J				
U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP			
1	-188	258	38	374	138.6	-193	207	20	322	137.6	20	14	-207	261	-11	376	141.2	35		
2	-233	307	54	413	140.3	-211	244	22	345	138.9	20	14	-240	305	-16	411	141.4	31		
3	-258	278	50	408	135.3	-231	236	20	348	135.5	18	13	-258	287	-15	405	137.8	29		
4	-269	277	52	410	134.5	-242	221	18	345	132.0	20	15	-275	269	-14	405	134.0	31		
5	-270	277	49	409	134.5	-248	208	19	343	129.3	19	15	-281	254	-14	400	131.4	32		

# ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS								I SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	75	200	57	26	37.6	107	133	25	35	31.8	120	148	21	26	30.7	
2	58	51	33	24	9.4	51	70	26	44	11.8	48	63	12	23	10.1	
3	68	102	20	20	17.9	25	47	11	22	7.8	38	46	10	18	8.2	
4	74	56	36	23	12.7	40	95	22	41	16.4	49	98	11	30	15.3	
5	58	106	71	49	15.7	29	120	31	45	20.5	48	131	23	49	19.7	

# CUMULATIVE STANDARD DEVIATIONS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT					
	U		V		W		TH		U		V		W		TH	
1	75	200	57	26	37.6	107	133	25	35	31.8	120	148	21	26	30.7	30.7
2	77	142	46	45	25.2	80	106	24	44	22.2	90	113	17	42	21.1	21.1
3	82	135	40	39	23.9	73	91	21	38	19.3	81	99	15	37	18.6	18.6
4	81	119	38	35	21.5	69	94	21	38	19.4	80	102	14	35	18.8	18.8
5	76	115	46	38	20.2	63	101	23	40	20.0	75	111	16	39	19.4	19.4

HEIGHT = 43.

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90.

START TIME 4:55:0  
END TIME 5:01:0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-228	353	26	424	146.6	-199	255	16	330	142.4	25	23	-233	336	-7	418	145.3	35
2	-294	284	44	458	130.7	-225	251	6	376	139.3	24	20	-261	304	-3	439	139.8	46
3	-301	306	56	440	135.7	-212	260	25	343	140.9	25	26	-281	339	-19	449	140.2	29
4	-348	278	56	455	128.2	-281	227	31	372	130.0	22	17	-322	284	-20	437	131.7	28
5	-318	257	55	427	127.8	-235	254	14	353	138.0	25	23	-273	329	-14	433	140.7	45

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-228	353	26	424	146.6	-199	255	16	330	142.4	25	23	-233	336	-7	418	145.3	35
2	-259	321	34	440	139.2	-211	253	11	351	141.0	25	22	-246	321	-5	428	142.7	40
3	-272	316	41	440	138.1	-212	255	16	348	141.0	25	23	-257	327	-9	434	141.9	36
4	-293	306	45	444	135.5	-230	249	20	355	138.0	24	21	-275	315	-12	435	139.2	34
5	-297	297	47	441	134.0	-231	249	19	354	138.0	24	22	-274	318	-13	435	139.5	36

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH
1	38	66	31	53	7.9	78	50	19	65	11.7	80	53	12	37	12.3	12.3	
2	95	209	29	45	32.0	144	115	31	38	29.7	151	134	16	44	27.8	27.8	
3	86	62	44	25	13.7	66	42	27	33	12.0	69	64	9	20	11.9	11.9	
4	60	92	15	50	12.3	87	44	26	45	14.3	75	57	9	47	11.3	11.3	
5	92	117	63	66	19.3	88	44	25	63	12.1	76	32	16	42	9.4	9.4	

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH
1	38	66	31	53	7.9	78	50	19	65	11.7	80	53	12	37	12.3	12.3	
2	75	147	30	51	22.9	109	82	25	57	21.0	113	96	13	40	20.2	20.2	
3	79	125	35	43	20.1	96	71	26	50	18.2	101	85	14	36	17.7	17.7	
4	81	116	32	45	18.7	97	66	26	49	17.7	98	80	13	38	16.6	16.6	
5	82	116	38	49	18.7	94	62	26	51	16.6	93	73	14	38	15.4	15.4	

```
START TIME 5: 0: 0
END TIME 5: 5: 0
```

SINE WAVE FIT

PEAKS			FOURIER COEFFICIENTS						I SINE WAVE FIT									
MIN	U	V	A	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-294	312	27	+33	136.4	-230	240	25	346	135.6	24	15	-274	303	-11	418	137.2	34
2	-299	281	79	+27	132.8	-298	182	24	355	121.7	26	16	-339	233	-18	416	124.4	35
3	-290	311	55	+37	137.0	-241	239	24	358	131.9	20	20	-305	311	-17	439	135.2	27
4	-304	459	49	+03	130.3	-244	209	24	356	125.9	15	11	-284	257	-17	405	129.6	26
5	-298	277	75	+31	134.4	-248	243	29	363	131.9	15	15	-295	297	-27	442	134.7	30

SINE WAVE FIT

PEAKS	I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	$\alpha$	SPEED	TH	U	V	$\omega$	SPEED	TH	2D	3D	U	V	$\omega$	SPEED		TH
1	-294	314	27	433	136.4	-230	240	25	346	135.8	24	15	-274	303	-11	418	137.2	34
2	-293	295	55	350	134.4	-267	209	24	351	128.2	25	15	-309	265	-15	417	130.3	34
3	-295	300	55	432	134.3	-265	214	24	353	129.4	23	17	-308	279	-16	414	131.9	32
4	-292	291	53	425	134.1	-269	216	24	354	128.5	21	16	-307	274	-16	419	131.3	31
5	-292	292	54	426	134.2	-269	222	25	356	129.3	20	15	-305	279	-18	420	132.0	31

SINE WAVE FIT

PULSE	PEAKS			J <sub>1</sub>				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH
	U	V	W	TH	SPEED	U	V	W	TH	SPEED	U	V	W	TH	SPEED	U	V	W	SPEED	
1	41	52	36	7.8	29	69	81	31	27	17.4	55	84	19	34	13.6					
2	21	106	36	17.2	51	53	50	21	34	10.7	47	52	11	34	8.6					
3	77	79	33	13.8	33	39	67	28	56	8.5	40	63	9	45	7.9					
4	39	52	16	33	33	23	54	20	29	8.3	32	60	12	26	8.9					
5	68	77	27	40	31	36	44	27	51	5.1	28	60	12	40	7.1					

SINE WAVE FIT

PTS.	PEAKS			I. FOURIER COEFFICIENTS							I. SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH		
1	41	52	36	7.8	6.6	81	31	27	17.4	55	84	19	34	
2	63	43	40	13.3	67	70	25	30	15.4	59	75	15	33	
3	65	40	34	13.1	58	69	26	33	13.5	53	73	13	37	
4	62	76	32	18.1	52	65	24	36	14.4	48	70	13	35	
5	60	75	34	12.1	49	61	23	39	11.2	44	67	13	36	

```
START TIME 5: 0: 0
END TIME 5: 5: 0
```

HD 90.

OTIS AIRFORCE

T VAD 9/18/76

45110 OTIS4

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	SPEED	TH	U	V	W	U	V	W	SPEED						
1	-277	464	49	394	134.1	-245	211	24	326	130.6	16	10	-274	264	-20	384	133.6	27
2	-304	434	63	419	126.6	-299	194	12	363	121.1	23	22	-342	239	-14	425	123.8	44
3	-261	444	54	403	138.7	-226	257	29	350	134.5	20	14	-256	302	-20	403	140.1	26
4	-293	441	50	385	129.2	-237	185	16	311	126.8	23	16	-285	217	-15	367	126.4	31
5	-276	455	67	393	130.1	-235	221	24	355	128.6	14	10	-296	255	-25	392	130.6	23

CUMULATIVE MEANS

LINE	PEAKS			FOURIER COEFFICIENTS			I SINE WAVE FIT			TH	SP							
	U	V	W	SPEED	TH	U	V	W	SPEED									
1	-237	464	49	393	134.1	-24.5	211	24	326	130.6	16	10	-276	264	-20	384	133.6	27
2	-283	446	56	406	130.3	-27.2	202	18	345	125.6	20	16	-309	251	-17	404	128.7	36
3	-231	465	57	405	133.4	-22.3	223	27	347	130.9	20	15	-289	270.9	-18	404	132.9	32
4	-247	459	55	400	132.4	-25.1	214	21	338	129.9	21	15	-288	257	-17	395	131.3	33
5	-247	458	56	399	132.0	-25.5	215	22	341	129.6	19	14	-290	257	-19	395	131.2	30

## ONE MINUTE STANDARD DEVIATIONS

[illegible]

## CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS			I, SINE WAVE FIT								
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	49	59	20	36	14.7	34	39	15	37	6.4	24	29	8	24	4.5
2	46	112	24	39	19.4	46	75	18	66	9.7	42	72	8	46	9.7
3	43	95	29	36	17.4	65	57	14	57	12.8	62	64	8	40	11.8
4	75	86	26	35	15.7	58	71	14	55	13.3	56	72	9	40	12.3
5	48	81	27	35	14.3	56	67	14	55	12.0	53	66	10	42	11.1

HEIGHT = 28.  
 VAD OTIS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 5: 5: 0  
 END TIME 5:10: 0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				SP					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED	TH		
1	-236	265	38	368	137.6	-193	213	13	298	138.5	23	18	-225	264	-10	359	139.7	32
2	-227	290	35	383	141.5	-253	170	10	316	123.1	17	11	-276	215	-10	362	127.3	39
3	-247	324	114	429	143.1	-250	173	10	315	126.7	42	31	-323	296	-10	442	132.7	34
4	-209	290	13	431	147.3	-257	180	26	327	124.8	26	22	-321	232	-15	415	124.2	40
5	-317	274	54	427	130.6	-247	228	20	341	131.4	19	9	-300	266	-11	405	131.0	39

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		
1	-236	265	38	368	137.6	-193	213	13	298	138.5	23	18	-225	264	-10	359	139.7	32
2	-234	276	37	375	139.4	-220	193	12	306	131.4	20	15	-249	242	-10	360	134.0	35
3	-237	291	61	392	140.5	-230	187	11	309	129.9	27	20	-272	259	-10	386	133.6	35
4	-229	290	48	403	142.4	-237	185	15	314	128.0	27	20	-285	252	-11	394	131.0	36
5	-246	287	49	407	140.2	-239	193	16	319	128.6	25	18	-288	254	-11	396	131.0	37

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	64	88	14	26	16.9	76	47	16	37	16.6	79	58	6	25	15.9
2	84	83	34	45	17.5	47	82	24	26	17.0	55	85	16	22	15.9
3	143	70	78	50	20.3	110	73	25	96	14.5	92	69	14	99	8.2
4	245	54	69	26	37.9	48	99	22	58	18.2	42	129	23	40	19.0
5	65	66	51	38	11.5	11	71	26	45	10.6	28	59	13	34	8.3

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS					SINE WAVE FIT					TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	
1	62	88	14	26	16.9	76	47	16	37	16.6	79	58	6	25	15.9
2	69	83	24	46	16.6	69	67	19	33	17.9	72	73	11	23	16.5
3	94	80	53	42	17.3	82	67	20	57	16.7	84	75	12	66	14.2
4	149	73	64	42	23.9	75	75	21	57	17.0	77	90	15	62	15.8
5	141	71	61	42	22.4	67	75	22	55	15.9	71	85	15	57	14.6

HEIGHT = 43.

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.

START TIME 5: 5: 0  
END TIME 5:10: 0

ONE MINUTE MEANS

MIN	PLAYS			FOURIER COEFFICIENTS										SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	
1	-23.8	305	37	399	141.7	-221	212	314	133.2	19	18	-254	281	-5	387	137.4	30	
2	-26.4	284	27	401	138.0	-263	193	7	335	125.5	18	10	-289	255	-4	394	130.8	34
3	-27.8	324	52	500	130.4	-259	254	39	374	136.5	26	12	-337	340	-19	463	135.3	33
4	-24.0	336	48	463	146.3	-180	255	18	378	144.2	19	21	-213	324	-9	458	148.2	46
5	-10.6	355	35	457	137.1	-222	266	13	352	140.4	28	21	-275	346	-2	449	141.4	40

CUMULATIVE MEANS

MIN	HEADS			FOURIER COEFFICIENTS										SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	
1	-23.8	305	37	399	141.7	-221	212	0	314	133.2	19	18	-254	281	-5	387	137.4	30
2	-25.1	300	32	400	137.8	-242	203	4	324	129.4	18	14	-272	268	-5	390	134.1	32
3	-26.8	305	43	437	136.3	-244	223	19	343	132.0	21	13	-296	295	-10	424	134.5	32
4	-24.4	315	44	443	138.7	-232	231	19	351	134.9	21	15	-276	302	-10	433	137.8	35
5	-26.8	319	42	446	138.4	-230	234	14	351	136.0	22	16	-276	311	-8	436	138.5	36

ONE MINUTE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS						I, SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	7.4	7.4	7.2	20	15.2	40	64	18	30	13.0	51	67	5	20	12.3
2	5.7	5.7	4.6	35	10.3	36	64	24	48	13.9	42	83	15	38	12.5
3	4.5	3.9	4.3	40	4.4	94	45	27	69	14.7	63	47	13	49	7.6
4	2.11	1.04	5.2	49	31.6	224	91	15	63	36.6	256	85	11	44	36.3
5	4.5	7.2	5.1	49	8.7	67	54	22	62	10.1	60	53	15	35	9.3

CUMULATIVE STANDARD DEVIATIONS

IN	PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	7.4	7.4	7.2	20	15.2	40	64	18	30	13.0	51	67	5	20	12.3
2	6.4	6.4	3.5	27	12.5	44	73	20	40	13.4	44	73	10	30	12.3
3	8.5	5.5	4.0	58	11.2	67	64	27	56	13.9	61	73	13	58	10.6
4	12.4	6.4	4.3	57	17.9	121	73	25	59	21.0	133	75	12	56	19.9
5	11.3	8.0	4.4	55	16.4	112	71	24	58	19.5	122	73	13	53	18.2

START TIME 5:10: 0  
END TIME 5:15: 0

HD 90.

UTIS AIRFORCE

4/18/76

CT VAD

TIME IN GHT

WELIGHT = 28.

# ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				SP
						I	U	V	W	3D	U	V	W	
1	-334	254	7	437	126.2	-124	222	0	242	152.4	60	42	-183	41
2	-340	160	73	413	112.7	-203	216	-9	297	136.6	78	66	-221	23
3	-294	410	154	426	124.6	-330	192	7	399	115.0	56	48	-364	31
4	-340	114	16	394	106.6	164	101	-14	192	238.4	58	35	326	59
5	-234	313	147	440	145.6	-11	167	0	302	192.0	64	84	153	80

# CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				SP
						I	U	V	W	3D	U	V	W	
1	-334	254	7	437	126.2	-124	222	0	242	152.4	60	42	-183	41
2	-341	440	17	434	124.2	-135	221	-1	284	150.2	63	45	-149	38
3	-324	232	67	431	124.4	-206	211	1	326	137.4	60	46	-253	35
4	-320	222	63	424	122.9	-175	201	0	315	145.8	60	45	-204	37
5	-316	235	73	430	126.1	-152	194	0	313	152.4	61	51	-153	43

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				TH
						I	U	V	W	3D	U	V	W	
1	65	124	40	60	17.0	124	63	22	38	30.5	230	159	47	109
2	64	124	40	59	16.3	117	54	21	36	24.5	210	147	45	105
3	160	214	147	74	36.5	74	165	32	127	21.9	184	267	70	292
4	6	0	0	0	0	0	0	0	0	0	0	0	0	0
5	263	106	173	67	37.4	344	116	10	78	81.8	313	1	83	145

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				TH
						I	U	V	W	3D	U	V	W	
1	65	124	40	60	17.0	124	63	22	38	30.5	230	159	47	109
2	64	124	40	59	16.3	117	54	21	36	24.5	210	147	45	105
3	160	214	147	74	36.5	140	102	29	95	30.7	211	196	54	141
4	95	142	106	57	23.1	171	102	23	78	41.3	262	179	59	173
5	116	132	115	56	25.1	193	100	22	73	47.4	287	164	71	171

START TIME 5:10:0  
END TIME 5:15:0

HD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN OUT

VAD OTIS4

HEIGHT = 43.

# ONE MINUTE MEANS

## SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-341	340	42	488	134.4	-266	251	6	367	133.3	21	15	-323	344	-6	472
2	-438	340	167	505	123.2	-325	278	30	435	130.4	45	26	-433	409	-37	599
3	-371	366	77	542	132.7	-290	272	29	408	134.3	27	10	-337	367	-29	514
4	-771	107	51	527	147.6	-207	194	13	330	128.3	43	45	-373	305	-1	536
5	-269	362	75	488	151.0	-249	173	22	339	117.4	42	41	-414	274	12	536

# CUMULATIVE MEANS

## SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-341	340	42	488	134.4	-266	251	6	367	133.3	21	15	-323	344	-6	472
2	-386	340	99	533	129.4	-293	263	17	398	132.0	32	20	-374	374	-20	531
3	-348	349	92	536	130.6	-292	266	21	402	132.8	30	17	-361	372	-23	525
4	-361	362	82	534	134.5	-272	250	19	385	131.7	33	23	-364	356	-18	527
5	-344	362	81	525	137.6	-268	235	20	376	129.1	35	27	-373	341	-12	529

# ONE MINUTE STANDARD DEVIATIONS

## SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	65	57	31	33	9.3	36	31	31	43	3.1	23	28	11	34	1.4
2	115	247	123	157	24.9	77	73	52	68	10.6	80	88	20	104	5.8
3	47	83	74	45	8.9	98	78	33	41	15.2	108	80	16	31	15.0
4	191	191	89	103	25.6	96	190	26	109	38.3	120	246	28	97	30.2
5	212	93	59	117	32.7	98	159	25	93	36.0	177	173	131	116	23.3

# CUMULATIVE STANDARD DEVIATIONS

## SINE WAVE FIT

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	65	57	31	33	9.3	36	31	31	43	3.1	23	28	11	34	1.4
2	101	152	105	116	18.4	64	53	42	64	7.4	79	69	22	97	4.3
3	84	130	94	96	15.5	75	61	39	68	10.4	89	71	20	79	9.2
4	123	132	93	45	19.2	86	105	36	93	19.5	94	129	24	82	16.2
5	144	125	86	99	22.6	88	114	34	85	23.4	112	139	58	87	17.7

HEIGHT = 46.

VAD OTIS4

TIME IN GMT CT VAD

9/18/76

OTIS AIRFORCE

HD 90.

START TIME 5:15: 0  
END TIME 5:20: 0

# ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	-104	110	234	355	133.9	-306	268	14	412	131.6	87	73	-511	428	94	675 129.4 40

# CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	-104	110	234	355	133.9	-306	268	14	412	131.6	87	73	-511	428	94	675 129.4 40

B 82

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	311	330	12	11	91.5	92	29	10	50	11.6	48	142	36	54	11.9	0

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	311	330	12	11	91.5	92	29	10	50	11.6	48	142	36	54	11.9	0

START TIME 5:15: 0  
END TIME 5:20: 0

OTIS AIRFORCE MD 90.

VAD OTIS4 TIME IN GMT CT VAD 9/18/76

HEIGHT = 43.

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-250	469	50	555	152.3	-243	277	22	375	139.4	30	25	-337	414	-21	537
2	-362	433	53	566	140.1	-261	287	45	402	137.2	39	24	-363	377	-29	531
3	-338	373	14	513	136.4	-308	253	20	404	129.6	18	19	-361	327	-6	491
4	-351	365	36	525	136.1	-288	255	3	394	132.2	28	35	-406	224	-2	542
5	-340	315	99	463	129.2	-276	195	27	352	125.1	36	39	-312	287	-35	435

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	-250	469	50	555	152.3	-243	277	22	375	139.4	30	25	-337	414	-21	537
2	-401	454	51	560	146.7	-252	282	33	388	138.4	34	24	-349	397	-25	534
3	-413	427	41	545	144.1	-269	273	29	393	135.6	29	23	-353	375	-19	520
4	-421	414	40	541	142.4	-273	267	23	393	134.9	29	25	-364	343	-15	525
5	-425	392	52	524	139.4	-274	252	24	394	132.7	30	28	-352	331	-20	505

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	159	90	47	70	16.6	82	40	36	55	11.0	62	55	18	60	5.9	36
2	50	38	29	45	4.5	48	66	17	50	16.8	65	67	13	35	9.5	36
3	99	56	26	38	12.0	54	53	23	32	10.0	53	52	7	38	7.5	36
4	121	110	44	62	17.0	98	63	28	71	13.3	235	272	24	176	30.6	35
5	76	169	99	117	19.7	71	109	39	79	17.3	86	91	53	70	14.0	35

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	159	90	47	70	16.6	82	40	36	55	11.0	62	55	18	60	5.9	36
2	130	71	38	58	14.9	82	62	30	52	13.4	62	61	16	48	7.8	36
3	120	75	36	56	14.3	77	60	28	47	12.8	58	66	16	49	8.1	36
4	116	85	38	56	14.4	80	59	29	51	12.7	113	142	19	85	15.4	35
5	109	114	60	76	16.7	77	74	31	59	14.2	108	133	30	90	14.9	35

HEIGHT = 28.  
VAD OTIS+ TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90.  
START TIME 5:20:0  
END TIME 5:25:0

ONE MINUTE MEANS

MIN	PEAKS	FOURIER COEFFICIENTS				I SINE WAVE FIT			
		V	W	TH	SP	U	V	W	SP
1	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U
4	-341	150	211	374	113.7	302	7	339	153.1
5	U	U	U	U	U	U	U	U	U

CUMULATIVE MEANS

MIN	PEAKS	FOURIER COEFFICIENTS				I SINE WAVE FIT			
		V	W	TH	SP	U	V	W	SP
1	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U
4	-341	150	211	374	113.7	302	7	339	153.1
5	U	U	U	U	U	U	U	U	U

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS	FOURIER COEFFICIENTS				I SINE WAVE FIT			
		V	W	TH	SP	U	V	W	SP
1	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U
5	U	U	U	U	U	U	U	U	U

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS	FOURIER COEFFICIENTS				I SINE WAVE FIT			
		V	W	TH	SP	U	V	W	SP
1	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U
5	U	U	U	U	U	U	U	U	U

HEIGHT \* 43. START TIME 5:20:0 OTIS AIRFORCE MD 90. END TIME 5:25:0

ONE MINUTE MEANS

MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-238	415	77	557	152.4	-158	261	26	380	150.2	41	22	-210	381	53
2	-330	464	71	575	144.4	-306	281	16	424	132.1	51	29	-394	354	44
3	-433	347	81	607	133.1	-278	340	28	447	141.0	40	30	-418	427	34
4	-325	480	123	585	145.5	-247	311	44	407	141.4	35	29	-279	422	42
5	-415	342	76	578	132.7	-267	314	21	417	139.7	28	25	-334	431	45

CUMULATIVE MEANS

MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-238	415	77	557	152.4	-158	261	26	380	150.2	41	22	-210	381	53
2	-280	437	74	565	148.8	-225	270	22	400	142.0	46	26	-294	369	49
3	-334	424	77	582	142.7	-246	297	24	418	141.6	43	27	-342	391	43
4	-336	436	84	582	143.4	-246	301	30	416	141.5	41	28	-326	399	43
5	-352	427	86	582	141.3	-250	303	28	416	141.2	39	27	-328	405	43

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	300	109	61	72	35.8	235	93	37	46	41.5	341	60	16	44	41.0
2	74	94	34	84	8.7	126	116	44	146	13.4	89	122	11	99	12.6
3	138	100	43	46	15.5	83	50	37	39	11.4	57	96	30	42	10.0
4	54	181	48	53	8.1	82	64	28	46	13.4	64	66	28	38	9.5
5	57	100	60	64	9.7	69	67	27	70	8.8	49	46	18	56	3.8

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	300	109	61	72	35.8	235	93	37	46	41.5	341	60	16	44	41.0
2	223	100	50	74	26.2	200	99	38	101	32.0	266	89	14	70	32.7
3	205	99	46	67	23.5	163	89	37	84	25.4	216	94	21	68	26.2
4	178	97	50	63	20.6	145	82	36	75	22.8	190	87	24	65	23.1
5	164	97	51	62	19.3	133	79	34	73	20.6	170	81	23	62	20.6

WARD	OTIS	TIME IN GALT CT	VAD	9/18/76	OTIS AIRFORCE	HU 90.
START TIME 5:25: 0						
END TIME 5:30: 0						

OTIS AIRFORCE  
HD 90.

9/18/76

VAD

714

VAN DYKE 07154

1

```
START TIME 5:25: 0
END TIME 5:30: 0
```

100

1

## ONE MINUTE MEANS

LINE	PEAKS			FOURIER COEFFICIENTS										I SINE WAVE FIT				TH	SP
	U	V	W	U	TH	U	V	W	SPEED	U	TH	2D	3D	U	V	W	SPEED		
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
2	-214	328	245	392	146.7	-274	287	11	398	136.3	79	58	-340	381	-13	512	138.2	40	
3	-90	362	70	372	170.1	-164	288	5	339	148.9	78	66	-16	271	-107	357	190.8	20	
4	-254	411	-63	420	136.0	-301	237	7	384	128.2	88	81	-239	325	-66	410	141.3	32	

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS						I			SINE WAVE FIT			SP		
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH
1	U	U	U	U	0.0	0	0	0	0	0	0	0	0	0	0	0	0
2	-214	324	245	392	146.7	-274	267	11	398	136.3	79	58	-340	381	-13	512	138.2
3	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
4	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
5	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
6	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
7	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
8	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
9	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
10	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
11	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
12	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
13	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
14	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
15	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
16	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
17	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
18	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
19	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
20	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
21	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
22	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
23	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
24	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
25	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
26	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
27	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
28	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
29	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
30	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
31	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
32	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
33	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
34	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
35	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
36	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
37	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
38	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
39	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3
40	-131	324	129	383	162.3	-201	288	7	359	144.7	79	63	-124	308	-76	408	173.3

### ONE MINUTE STANDARD DEVIATIONS

[illegible]

## CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS				I, SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	202	31	134	72	31.5	7.6	6.3	4	50	14.0	131	134
4	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
5	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
6	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
7	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
8	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
9	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
10	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
11	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
12	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
13	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
14	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
15	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
16	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
17	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
18	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
19	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
20	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
21	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
22	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
23	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
24	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
25	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
26	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
27	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
28	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
29	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
30	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
31	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
32	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
33	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
34	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
35	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
36	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
37	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
38	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
39	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
40	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
41	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
42	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
43	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
44	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
45	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
46	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
47	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
48	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
49	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
50	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
51	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
52	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
53	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
54	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
55	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
56	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
57	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
58	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
59	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
60	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
61	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
62	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
63	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
64	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
65	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
66	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
67	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
68	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
69	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
70	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
71	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
72	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
73	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
74	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
75	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
76	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
77	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
78	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
79	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
80	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
81	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
82	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
83	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
84	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
85	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
86	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
87	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
88	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
89	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
90	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
91	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
92	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
93	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
94	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
95	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
96	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
97	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
98	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
99	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134
100	202	31	134	72	31.5	7.6	6.4	4	50	14.0	131	134

HEIGHT = 43.

VAD OTIS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.

START TIME 5:25:0  
END TIME 5:30:0

ONE MINUTE MEANS

PEAKS									
MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS		
							U	V	W
1	-436	384	91	585	130.9	-351	255	29	440
2	-416	350	58	544	130.1	-288	302	23	425
3	-390	409	141	585	134.4	-291	330	46	445
4	-327	429	46	547	142.3	-279	278	31	398
5	-364	355	74	530	132.5	-278	278	33	397
SINE WAVE FIT									
	3D	U	V	W	SPEED	TH	SP		
1	41	-415	406	-24	584	134.2	36		
2	13	-327	377	-13	504	139.7	41		
3	24	-373	454	-35	589	140.4	31		
4	18	-340	378	-14	516	138.3	40		
5	15	-351	367	-13	513	136.4	42		

CUMULATIVE MEANS

PEAKS									
MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS		
							U	V	W
1	-436	384	91	585	130.9	-351	255	29	440
2	-427	366	76	584	130.5	-322	277	26	433
3	-415	381	96	573	131.7	-312	294	32	437
4	-391	394	83	566	134.6	-303	289	32	426
5	-386	387	81	559	134.2	-298	287	32	421
SINE WAVE FIT									
	3D	U	V	W	SPEED	TH	SP		
1	41	-415	406	-24	584	134.2	36		
2	28	-374	393	-19	547	136.7	38		
3	27	-374	412	-24	560	137.9	36		
4	24	-365	403	-21	548	138.0	37		
5	23	-362	396	-20	542	137.7	38		

ONE MINUTE STANDARD DEVIATIONS

PEAKS									
MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS		
							U	V	W
1	39	34	86	64	6.8	47	57	22	24
2	62	42	51	42	7.0	94	37	19	56
3	66	171	108	88	16.5	56	72	44	59
4	70	79	44	41	10.3	78	24	23	58
5	89	156	69	79	18.6	57	70	21	65
SINE WAVE FIT									
	3D	U	V	W	SPEED	TH	SP		
1	60	15	49	6.0	6.0	6.0	6.0		
2	33	29	45	3.4	3.4	3.4	3.4		
3	43	13	24	10.5	10.5	10.5	10.5		
4	63	20	63	8.1	8.1	8.1	8.1		

CUMULATIVE STANDARD DEVIATIONS

PEAKS									
MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS		
							U	V	W
1	39	84	86	64	6.8	47	57	22	24
2	50	69	71	57	6.6	76	53	20	41
3	56	108	87	66	10.4	71	63	30	46
4	71	102	81	61	11.2	73	55	28	51
5	74	112	78	65	12.6	70	57	26	54
SINE WAVE FIT									
	3D	U	V	W	SPEED	TH	SP		
1	60	15	49	6.0	6.0	6.0	6.0		
2	50	13	44	7.7	7.7	7.7	7.7		
3	56	20	61	6.7	6.7	6.7	6.7		
4	71	19	57	7.7	7.7	7.7	7.7		
5	74	19	58	7.7	7.7	7.7	7.7		

MEIGHT = 26. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 5:30:0 END TIME 5:35:0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT							
MIN	U	V	W	TH	U	V	W	TH	SP	I	3D	U	V	W	TH	SP	
1	-57	341	45	558	165.7	-341	157	25	443	101.2	75	92	-890	799	402	1268	41
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	-395	302	21	522	130.4	-281	214	7	376	129.2	63	50	-366	304	-26	499	27
4	-365	247	71	470	121.2	-251	265	23	385	135.1	51	34	-356	359	-15	512	20
5	-14	480	51	613	174.4	-276	272	10	403	138.3	54	50	-227	223	-133	419	56

CUMULATIVE MEANS

FOURIER COEFFICIENTS																	SINE WAVE FIT			
I																	I			
PEAKS																				
	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP			
1	-57	341	45	558	165.7	-341	157	25	443	101.2	75	92	-890	799	402	1268	41			
2	-57	341	45	558	165.7	-341	157	25	443	101.2	75	92	-890	799	402	1268	41			
3	-284	315	29	534	142.2	-301	195	13	398	119.9	67	64	-541	469	116	756	32			
4	-324	281	50	502	131.7	-276	230	18	392	127.5	59	49	-449	414	50	634	26			
5	-220	347	50	539	145.9	-276	244	15	396	131.1	57	49	-375	350	-10	562	36			

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS																	SINE WAVE FIT					
MIN	PEAKS				I <sub>1</sub>										I <sub>2</sub>				I <sub>3</sub>			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	594	183	6	50	73.4	110	381	10	220	48.4	822	1220	722	1347	42.5							
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
3	186	80	56	95	21.3	123	94	24	61	22.6	139	109	17	38	20.4							
4	56	181	79	71	24.4	66	124	11	55	20.6	71	59	16	46	8.7							
5	393	200	73	140	44.4	172	45	19	132	19.4	281	203	206	176	68.4							

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS																	SINE WAVE FIT				
PEARS																					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	594	183	6	50	73.4	110	381	10	220	48.4	822	1220	722	1347	42.5	42.5					
2	594	183	6	50	73.4	110	381	10	220	48.4	822	1220	722	1347	42.5	42.5					
3	350	104	45	79	41.0	112	169	21	114	31.4	469	609	392	722	27.3	27.3					
4	243	145	65	79	34.0	91	158	17	86	26.5	334	416	273	504	20.3	20.3					
5	326	166	66	113	41.9	119	131	18	100	24.4	327	364	262	429	44.2	44.2					

HEIGHT = 43. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 5:30:0 END TIME 5:35:0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										I										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	I	3D	U	V	W	SPEED	TH	SP													
1	-396	409	28	578	135.5	-344	234	34	425	122.5	24	21	-421	329	-11	549	127.8	46																					
2	-404	440	37	607	137.8	-323	345	29	477	136.4	17	13	-382	436	-17	583	138.6	39																					
3	-366	390	37	544	137.2	-352	162	0	403	112.3	19	26	-401	208	-2	474	115.6	59																					
4	-261	486	22	512	139.9	-264	254	-7	447	125.3	15	32	-302	301	2	517	128.3	73																					
5	-364	421	51	574	137.8	-217	350	-5	456	148.5	25	18	-237	442	-1	542	152.1	71																					

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT								
MIN	PEAKS			I			I				I			I				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-396	409	28	578	135.5	-344	234	34	425	122.5	24	21	-421	329	-11	549	127.8	46
2	-399	425	33	593	136.7	-333	280	31	451	129.5	21	17	-401	383	-14	566	133.2	42
3	-387	412	35	575	136.9	-340	243	19	433	123.2	20	20	-401	318	-9	532	126.7	49
4	-357	382	32	560	137.6	-322	245	13	437	123.7	19	23	-378	314	-6	529	127.1	54
5	-358	389	35	562	137.7	-302	266	9	440	128.5	20	22	-350	339	-5	531	131.9	58

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS																	SINE WAVE FIT			
PEAKS																				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH					
1	77	100	36	64	10.6	25	111	11	63	13.9	75	123	21	52	14.1					
2	106	61	52	28	11.6	37	66	22	44	7.5	45	66	27	42	6.6					
3	97	47	36	29	11.2	42	128	12	67	17.8	48	153	7	54	19.3					
4	265	256	42	49	45.4	143	277	9	139	41.0	169	295	11	116	41.0					
5	85	139	61	66	15.6	183	126	15	67	27.9	199	113	18	50	24.5					

CUMULATIVE STANDARD DEVIATIONS

I. FOURIER COEFFICIENTS																	SINE WAVE FIT			
PEAKS				I. FOURIER COEFFICIENTS													SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH					
1	77	100	36	64	10.6	25	111	11	63	13.9	75	123	21	52	14.1					
2	88	81	43	49	10.7	32	104	17	58	12.9	62	109	23	48	11.9					
3	91	71	39	49	10.6	36	127	22	64	16.7	56	151	20	67	16.9					
4	154	144	39	55	22.7	80	168	23	85	23.7	101	188	18	79	23.8					
5	142	141	44	56	21.3	112	164	23	81	26.0	134	181	18	74	25.6					

HEIGHT = 28.

VAD 0154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HU 90. START TIME 5:35:0  
END TIME 5:40:0

ONE MINUTE MEANS

PEAKS	FOURIETH COEFFICIENTS										SINE WAVE FIT										
	I		U		V		W		TH		I		U		V		W		TH		SP
1	49	501	24	575	187.7	-206	266	6	370	143.4	50	47	-347	381	-26	567	135.8	58			
2	-407	316	41	524	128.2	-211	293	20	375	144.5	62	38	-302	406	-40	529	143.3	24			
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4	-326	336	148	483	132.8	-233	367	33	440	147.7	58	45	-273	470	-17	544	149.7	29			
5	-365	343	68	510	133.5	-243	262	0	379	142.7	41	53	-274	369	-30	518	144.4	34			

CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT							
	I	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	SP		
1	49	501	24	575	147.7	-206	266	6	370	143.4	50	47	-347	381	-26	567	135.8	58
2	-106	427	49	555	163.9	-208	276	11	372	143.9	55	44	-329	391	-32	552	138.8	44
3	-106	427	49	555	163.9	-208	276	11	372	143.9	55	44	-329	391	-32	552	138.8	44
4	-167	401	77	534	155.0	-215	302	18	372	145.0	56	44	-313	414	-28	549	141.9	40
5	-228	384	75	527	148.6	-223	290	12	388	144.3	52	47	-301	400	-29	540	142.7	38

ONE MINUTE STANDARD DEVIATIONS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT					
	I	U	V	W	TH	U	V	W	TH	SP	I	U	V	W	TH	SP
1	28.1	113	432	86	31.5	145	126	10	91	28.0	143	229	51	85	27.6	58
2	6.4	64	62	31	11.5	107	96	16	85	17.3	148	92	51	29	18.7	44
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	42	173	152	120	17.8	79	72	19	79	10.0	44	74	15	83	2.7	40
5	103	73	65	78	11.4	176	64	15	130	23.8	260	85	46	78	29.9	38

CUMULATIVE STANDARD DEVIATIONS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT					
	I	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP		
1	28.1	113	432	86	31.5	145	126	10	91	28.0	143	229	51	85	27.6	
2	6.4	64	62	31	11.5	107	96	16	85	17.3	148	92	51	29	18.7	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	42	173	152	120	17.8	79	72	19	79	10.0	44	74	15	83	2.7	
5	103	73	65	78	11.4	176	64	15	130	23.8	260	85	46	78	29.9	

AD-A038 514

LOCKHEED MISSILES AND SPACE CO INC HUNTSVILLE ALA HU--ETC F/G 4/2  
REMOTE WIND MEASUREMENT IN FOG USING LASER DOPPLER VELOCIMETRY.(U)  
DEC 76 H R BRASHEARS, W R EBERLE F19628-76-C-0237

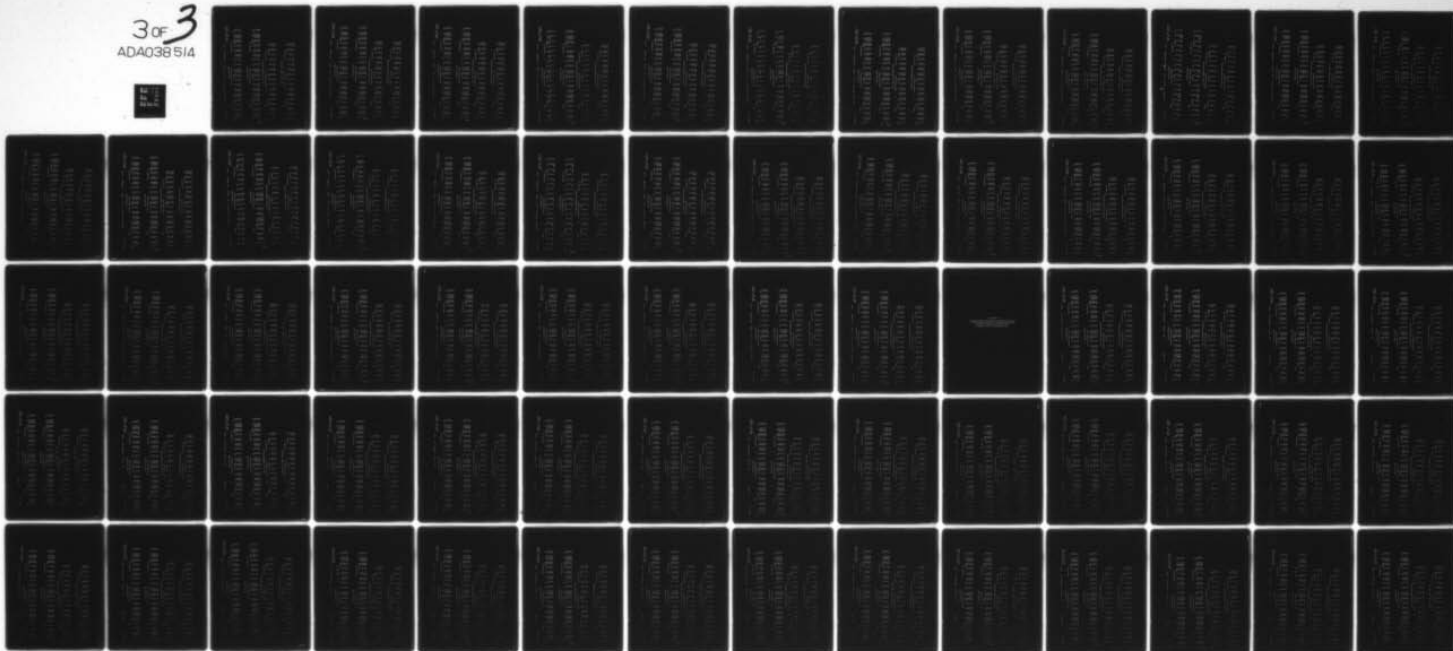
UNCLASSIFIED

LMSC-HREC-TR-D497127

AFGL-TR-76-0313

NL

3 of 3  
ADA038514



END

DATE  
FILMED

5-77

HEIGHT = 43.  
START TIME 5:35:0  
END TIME 5:40:0

HD 90.

OTIS AIRFORCE

9/18/76

CT VAL

TIME IN GHT

OTIS4

VAD

HEIGHT = 43.

# ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-36.7	422	60	564	139.0	-322	324	25	458	135.2	17	15	-362	425	-26	560	139.6	30
2	-41.3	319	31	529	127.6	-291	289	39	413	134.4	22	24	-359	388	-10	532	136.9	39
3	-31.4	455	46	564	145.3	-310	350	39	470	138.2	14	7	-349	427	-20	553	140.5	31
4	-37.3	392	72	551	135.5	-199	315	12	428	149.5	27	25	-239	386	-9	527	151.2	51
5	-35.6	419	28	556	139.4	-316	284	39	424	137.4	27	17	-402	363	-13	544	132.1	41

# CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-36.7	422	60	564	139.0	-322	324	25	456	135.2	17	15	-362	425	-26	560	139.6	30
2	-34.9	375	47	550	133.8	-308	304	31	437	134.8	19	19	-361	408	-18	547	138.3	34
3	-36.5	400	46	554	137.4	-309	321	34	448	135.9	17	16	-357	414	-19	549	139.0	33
4	-34.7	398	53	553	136.9	-279	319	28	443	139.5	20	18	-325	406	-16	543	142.3	38
5	-36.5	402	49	554	137.4	-286	314	30	440	138.2	21	18	-340	398	-16	543	140.4	39

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH
1	40	69	37	67	9.3	70	61	29	89	3.5	49	40	10	52	3.7		
2	73	79	42	54	10.0	47	63	18	62	6.6	39	68	17	60	5.3		
3	98	76	29	24	12.3	21	43	30	25	5.0	21	43	22	28	4.1		
4	88	111	69	97	11.4	210	144	26	114	36.5	260	156	24	88	36.7		
5	77	87	69	73	9.7	66	48	17	75	4.3	46	40	21	46	4.2		

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH
1	40	69	37	67	9.3	70	61	29	89	3.5	49	40	10	52	3.7		
2	83	89	40	62	10.9	60	62	25	78	4.9	43	55	15	55	4.5		
3	92	91	36	53	12.3	50	57	26	67	5.1	37	52	17	48	4.4		
4	84	95	47	65	11.9	122	86	27	80	19.4	142	89	19	60	19.2		
5	86	92	52	65	11.4	114	81	26	78	17.7	132	83	19	57	17.8		

HEIGHT = 28. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 5:40:0  
END TIME 5:45:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		
1	-270	227	73	433	122.3	-132	323	22	380	156.1	50	24	-191	344	-24	460	152.9	33		
2	-335	270	33	465	127.3	-190	290	6	359	145.9	54	47	-251	315	-21	419	143.5	25		
3	-368	356	63	520	134.3	-236	251	4	367	140.7	77	45	-379	322	-17	543	134.0	29		
4	-323	366	172	495	138.4	-215	327	30	413	145.2	52	39	-269	450	-37	532	148.5	30		
5	-336	156	151	398	113.7	-208	225	13	366	132.9	73	75	-464	177	-30	526	109.1	25		

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		
1	-270	227	73	433	122.3	-132	323	22	380	156.1	50	24	-191	344	-24	460	152.9	33		
2	-307	253	49	452	125.3	-167	303	12	367	150.0	53	38	-227	327	-22	435	147.3	28		
3	-333	296	54	480	129.0	-196	282	9	367	146.2	63	41	-290	325	-20	479	141.8	28		
4	-331	312	81	483	131.2	-200	292	14	378	145.9	60	41	-285	353	-24	491	143.3	29		
5	-332	283	94	468	127.9	-201	280	14	375	143.5	63	47	-318	321	-25	498	137.0	28		

B 1 92

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	37	291	58	48	45.1	162	76	29	51	25.8	269	59	13	30	36.8		
2	77	183	57	59	25.2	71	84	13	49	16.9	142	66	46	95	18.2		
3	81	76	85	78	8.8	171	61	19	122	20.2	210	151	48	115	24.5		
4	98	102	92	109	11.0	110	116	21	64	20.1	81	89	37	71	10.5		
5	122	143	154	97	25.3	152	176	26	72	36.4	140	200	191	154	22.1		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	37	291	58	48	45.1	162	76	29	51	25.8	269	59	13	30	36.8		
2	70	418	58	54	32.2	111	74	21	48	20.2	191	62	35	76	25.7		
3	78	178	68	72	25.2	138	75	20	43	20.1	207	104	40	106	25.3		
4	81	164	88	79	22.8	130	85	22	40	19.6	185	112	39	100	22.8		
5	87	170	103	87	23.8	131	104	22	77	23.3	189	146	43	109	26.0		

HEIGHT = 43. VAD 0154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 5:40:0 END TIME 5:45:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-336	458	51	573	143.9	-312	346	29	476	138.4	17	9	-350	418	-18	555	140.1	45
2	-365	344	26	506	133.3	-321	247	32	408	127.0	18	12	-352	318	-16	478	131.5	35
3	-400	423	74	620	135.3	-239	373	18	493	142.8	26	18	-279	464	-16	590	145.7	70
4	-273	531	63	602	152.9	-274	331	34	446	140.8	28	17	-343	439	-16	572	142.2	46
5	-352	454	47	578	142.0	-217	358	30	426	150.2	26	11	-270	446	-11	530	149.2	42

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										I				SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		
1	-336	458	51	573	143.9	-312	346	29	476	138.4	17	9	-350	418	-18	555	140.1	45		
2	-352	396	38	537	138.2	-317	292	30	439	132.3	18	11	-351	364	-17	514	135.5	40		
3	-367	405	49	563	137.3	-292	318	26	456	135.6	20	13	-328	396	-17	538	138.7	49		
4	-345	435	52	572	141.0	-288	321	28	454	136.8	22	14	-332	406	-17	546	139.5	48		
5	-346	434	51	574	141.3	-272	329	29	448	139.8	23	13	-318	415	-16	542	141.7	47		

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURTH COEFFICIENTS							SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	76	30	44	30	7.7	98	53	22	40	13.3	94	60	22	28	11.4		
2	54	47	66	26	7.4	20	59	17	43	6.2	23	73	21	50	6.9		
3	98	211	122	25	22.7	145	207	22	98	29.5	172	209	18	91	25.9		
4	87	66	46	74	8.3	110	74	41	42	17.6	123	103	29	82	14.9		
5	69	86	40	88	6.8	108	104	21	127	13.0	108	93	18	100	11.9		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS								SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	76	30	44	30	7.7	98	53	22	40	13.3	94	60	22	28	11.4
2	64	71	57	44	9.1	65	74	19	53	11.3	63	83	21	56	9.9
3	77	126	81	55	14.1	100	131	20	72	18.7	110	138	19	76	16.6
4	88	126	74	61	14.5	101	114	24	65	18.3	110	130	21	77	16.0
5	83	117	67	66	13.1	105	116	25	81	16.0	111	122	20	81	15.5

HEIGHT = 26. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HU 90. START TIME 5:45: 0 END TIME 5:50: 0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-253	121	-97	281	115.5	24	233	-6	234	186.0	77	68	-54	206	51	213	165.1	26
2	-382	494	12	625	142.2	-285	279	41	399	134.3	62	58	-346	379	-47	514	137.5	77
3	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	U	U	.0	U
4	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	U	U	.0	U
5	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	U	U	.0	U

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-253	121	-97	481	115.5	24	233	-6	234	186.0	77	68	-54	206	51	213	145.1	26
2	-317	307	-42	453	128.8	-130	256	17	317	160.1	69	63	-200	293	1	364	151.3	52
3	-317	307	-42	453	128.8	-130	256	17	317	160.1	69	63	-200	293	1	364	151.3	52
4	-317	307	-42	453	128.8	-130	256	17	317	160.1	69	63	-200	293	1	364	151.3	52
5	-317	307	-42	453	128.8	-130	256	17	317	160.1	69	63	-200	293	1	364	151.3	52

ONE MINUTE STANDARD DEVIATIONS

PEAKS				I. FOURIER COEFFICIENTS				I. SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0
2	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0
3	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0
4	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0
5	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0

CUMULATIVE STANDARD DEVIATIONS

PEAKS				I. FOURIER COEFFICIENTS				I. SINE WAVE FIT								
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	U	U	U	U	.0	U	U	U	U	U	U	U	U	U	U	U
2	91	264	77	243	18.9	219	33	34	117	36.6	206	122	70	213	19.5	19.5
3	91	264	77	243	18.9	219	33	34	117	36.6	206	122	70	213	19.5	19.5
4	91	264	77	243	18.9	219	33	34	117	36.6	206	122	70	213	19.5	19.5
5	91	264	77	243	18.9	219	33	34	117	36.6	206	122	70	213	19.5	19.5

HEIGHT = 43. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HU 90. START TIME 5:45:0 END TIME 5:50:0

ONE MINUTE MEANS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT								
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-285	525	41	608	151.8	-288	361	26	465	141.7	25	14	-352	475	-9	594	143.3	42
2	-327	314	-9	556	136.4	-296	287	0	447	128.2	49	25	-362	232	-125	533	161.0	43
3	-443	431	46	634	134.5	-254	391	15	471	147.3	43	29	-409	421	-9	596	135.8	47
4	-395	513	71	708	141.6	-298	386	33	495	143.1	33	28	-353	519	-24	635	145.8	45
5	-296	389	35	537	143.7	-326	315	9	475	131.0	55	47	-275	460	-45	546	151.8	28

CUMULATIVE MEANS

PEAKS					FOURIER COEFFICIENTS					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-285	525	41	608	151.6	-286	361	26	465	141.7	25	14	-352	475	-9	594	143.3	42	
2	-306	420	15	563	144.1	-292	324	13	456	134.9	37	19	-357	354	-67	563	152.1	43	
3	-340	422	23	596	141.7	-283	341	14	460	138.0	39	22	-370	371	-53	571	148.0	44	
4	-353	444	35	622	141.7	-286	352	18	468	139.2	37	23	-366	406	-46	587	147.5	44	
5	-342	433	35	606	142.1	-294	345	16	469	137.6	41	28	-349	416	-46	579	148.3	41	

B 195

ONE MINUTE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	123	102	67	103	12.3	65	47	35	64	6.5	68	90	22	99	5.4
2	260	270	102	119	38.3	63	221	39	134	29.3	263	297	207	200	88.1
3	136	92	48	32	14.9	79	47	25	60	8.8	82	82	37	43	10.4
4	214	237	70	35	27.5	120	107	37	135	10.2	103	97	35	96	9.4
5	228	164	262	135	31.4	66	182	12	112	21.8	153	134	114	165	15.2

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				
MIN	U	V	* SPEED	TH	U	V	W SPEED	TH	U	V	W SPEED	TH
1	123	102	67 103	12.3	65	49	35 64	6.5	68	90	22 99	5.4
2	195	223	97 109	26.3	61	154	38 101	21.4	183	245	153 154	60.2
3	148	196	78 97	25.5	65	143	34 91	19.6	163	215	135 134	52.3
4	190	204	75 99	25.3	78	132	35 100	17.7	149	202	118 127	45.5
5	194	195	126 109	25.9	76	139	32 100	18.4	151	190	115 132	41.2

HEIGHT = 28. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90. START TIME 5:50: 0  
END TIME 5:55: 0

ONE MINUTE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS					I			SINE WAVE FIT			TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED			
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0
2	-133	-85	12	159	57.1	-90	66	3	112	125.8	28	30	-4	0	-85	5	91.7	3	0
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0
5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			SP		
	U	V	W	TH	U	V	W	TH	20	30	U	V		W	TH
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	-133	-85	12	159	57.1	-90	66	3	112	125.8	28	30	-4	0	91.7
3	-133	-85	12	159	57.1	-90	66	3	112	125.8	28	30	-4	0	91.7
4	-133	-85	12	159	57.1	-90	66	3	112	125.8	28	30	-4	0	91.7
5	-133	-85	12	159	57.1	-90	66	3	112	125.8	28	30	-4	0	91.7

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

HEIGHT = 43. VAD OT154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90+ START TIME 5:50:0  
END TIME 5:55:0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS						I SINE WAVE FIT								
MIN	U	V	W	SPED	TH	U	V	W	SPED	TH	2D	3D	U	V	W	SPED	TH	SP
1	-427	384	-50	604	130.8	-173	371	16	426	152.9	38	69	-341	477	-4	589	144.4	27
2	-375	359	102	583	134.2	-217	330	24	440	153.9	52	53	-308	349	-39	514	146.1	56
3	-284	341	136	594	138.5	-284	213	-12	382	123.9	67	44	-460	344	-67	649	127.8	41
4	-376	549	65	646	148.9	-222	417	32	511	143.3	46	48	-306	485	-35	588	144.2	46
5	-219	365	32	539	151.7	-162	319	9	368	153.2	51	34	-269	470	10	550	150.0	34

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS								I SINE WAVE FIT							
MIN	U	V	W	SPED	TH	U	V	W	SPED	TH	2D	3D	U	V	W	SPED	TH	SP	
1	-427	384	-50	604	130.4	-173	371	16	426	152.9	38	69	-341	477	-4	589	144.4	27	
2	-394	369	45	591	133.0	-200	345	21	435	153.5	47	59	-320	397	-25	542	145.4	45	
3	-364	372	70	592	134.5	-223	309	12	420	145.4	52	55	-358	383	-37	572	140.6	44	
4	-352	427	68	609	139.0	-223	343	18	449	144.8	50	53	-342	415	-36	577	141.8	45	
5	-316	410	58	590	142.4	-206	336	16	427	147.1	50	48	-322	430	-23	569	144.0	42	

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	134	192	30	66	21.5	102	122	34	67	20.3	54	40	26	26	6.1		
2	235	203	171	97	30.7	227	114	27	134	35.8	253	154	41	169	36.9		
3	225	376	140	45	46.7	55	170	14	59	26.0	215	304	52	54	33.2		
4	94	95	44	79	9.2	78	261	23	165	33.7	124	219	30	206	16.7		
5	324	167	82	47	42.5	48	47	24	39	14.2	87	70	24	45	10.5		

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	139	192	30	66	21.5	102	122	34	67	20.3	54	40	26	26	6.1		
2	195	185	153	82	26.0	181	110	28	108	29.2	194	136	38	134	28.1		
3	198	228	144	72	30.2	159	135	29	97	30.4	200	179	44	125	29.0		
4	170	411	123	76	26.1	136	182	28	124	30.3	177	191	39	148	25.3		
5	222	198	113	75	30.8	126	154	28	113	26.8	159	167	41	127	22.3		

HEIGHT = 43.

VAD OTIS4

TIME IN GMT CT VAD

9/18/76

OTIS AIRFORCE

HD 90.

START TIME 5:55: 0  
END TIME 6: 0: 0

# ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED		TH
1	-246	482	50	569	156.6	-210	330	12	416	147.7	57	42	-283	482	-11	565	149.0	35
2	-404	445	64	682	136.8	-296	427	4	542	143.9	66	45	-444	682	64	819	144.8	35
3	-238	451	124	587	144.8	-324	304	7	490	129.4	65	72	-342	365	0	565	127.4	46
4	-320	375	161	528	139.6	-329	374	0	512	139.5	68	39	-406	515	-9	694	142.0	23
5	-202	491	-28	565	159.2	-210	339	1	412	148.0	75	27	-367	458	30	590	141.2	36

# CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-246	482	50	569	156.6	-210	330	12	416	147.7	57	42	-283	482	-11	565	149.0	35
2	-312	466	56	616	148.4	-246	371	9	468	146.1	61	43	-350	565	20	671	147.2	35
3	-285	461	80	605	147.1	-274	344	8	476	140.0	62	54	-347	491	12	632	139.9	39
4	-292	443	97	589	144.5	-286	354	6	484	139.9	64	51	-359	496	8	645	140.4	35
5	-242	448	83	586	146.1	-277	352	5	476	140.8	65	48	-360	492	10	639	140.4	35

B-98

# ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I			
1	194	106	86	113	23.9	131	91	36	53	22.0	73	94	34	83	8.7
2	208	308	66	98	30.5	125	187	24	148	17.4	150	404	184	420	6.2
3	147	291	177	93	40.2	111	204	12	87	28.5	119	287	54	129	38.6
4	71	234	269	127	24.7	149	154	9	182	14.6	191	204	37	121	21.2
5	235	44	40	50	25.0	105	83	14	35	18.3	51	54	33	35	6.3

# CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	194	106	86	113	23.9	131	91	36	53	22.0	73	94	34	83	8.7
2	207	203	75	117	27.4	130	141	30	117	19.4	134	273	120	291	7.8
3	186	231	122	107	31.7	126	164	25	105	23.9	126	288	100	245	25.1
4	168	229	159	113	30.3	130	159	27	121	22.0	139	269	90	224	23.9
5	173	216	156	104	29.7	128	157	27	116	21.4	131	254	85	212	22.6

HEIGHT = 43. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 6: 0: 0 END TIME 6: 5: 0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				SP					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED	TH		
1	-455	327	135	578	121.4	-209	263	4	350	137.8	79	59	-278	238	-44	506	118.2	50
2	-328	542	130	658	151.7	-272	465	11	545	149.6	50	42	-406	616	6	741	147.1	27
3	-397	558	16	687	144.6	-199	395	8	451	152.6	32	50	-419	542	6	690	142.5	35
4	-357	532	97	667	147.9	-281	307	15	427	135.3	56	35	-306	483	-10	612	146.5	70
5	-325	574	72	663	150.1	-333	383	41	508	139.2	48	35	-412	518	-32	665	141.4	34

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-455	327	135	578	121.4	-209	263	4	350	137.8	79	59	-278	238	-44	506	118.2	50
2	-340	489	131	634	144.1	-256	414	9	426	146.6	57	46	-374	521	-5	682	139.9	32
3	-367	502	104	644	144.2	-245	411	9	447	147.8	52	47	-383	525	-3	684	140.4	33
4	-364	511	105	653	145.3	-255	381	10	470	144.3	53	44	-361	513	-5	663	142.2	44
5	-357	522	94	655	146.1	-269	382	16	477	143.4	52	42	-370	514	-10	664	142.0	42

ONE MINUTE STANDARD DEVIATIONS

MIN.	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	85	293	173	232	20.7	35	170	1	107	23.1	142	498	106	155	63.6
2	210	64	124	104	19.7	84	79	34	73	9.8	133	108	93	156	5.6
3	64	19	103	22	5.3	92	88	16	36	15.6	117	34	10	45	9.4
4	225	47	91	83	19.4	27	143	19	107	13.4	203	180	36	107	23.1
5	34	85	17	54	6.3	88	74	19	110	3.5	45	65	18	49	5.4

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	85	293	173	232	20.7	35	170	1	107	23.1	142	498	106	155	63.6
2	190	159	123	132	23.1	78	131	30	116	13.2	138	273	91	181	27.9
3	164	143	124	119	20.5	79	120	27	105	13.0	129	241	81	160	24.8
4	178	124	112	107	19.5	69	130	25	105	13.9	149	219	69	147	23.6
5	161	117	102	99	17.8	76	120	26	104	12.7	137	199	64	133	21.4

HEIGHT = 28. VAD OTIS4 TIME IN GMT CT VAD 9/18/00 OTIS AIRFORCE HU 90. START TIME 6:20:0 END TIME 6:25:0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT													
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	2D	3D	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	-37	70	92	80	151.4	0	-12	149	0	149	175.1	95	87	4	27	-71	27	187.8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	59	142	-5	154	202.4	-33	119	119	2	124	164.1	39	63	-104	128	-16	165	140.7	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT												
MIN	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	SP	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	-37	70	92	80	151.4	0	-12	149	0	149	175.1	95	87	4	27	-71	27	187.8	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	10	106	43	117	176.9	-22	134	134	1	136	169.6	67	75	-49	77	-43	96	164.2	10	10	10	10	10	10	10	10	10	10	10	10	10	10

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I					
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
5	48	51	49	52	36.1	15	21	21	1	18	7.7	77	71	39	97	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3					

HEIGHT = 43. VAD OT154 TIME IN GMT CT VAD 9/18/76 OT15 AIRFORCE HD 90. START TIME 6:20:0 END TIME 6:25:0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										I SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		3D	U	V	W	SPEED	TH	SP			
1	-145	485	-47	531	163.6	-243	299	0	410	139.9	60	52	-199	390	-25	519	164.2	33		52	-199	390	-25	519	164.2	33			
2	-266	413	279	549	138.7	-390	473	24	616	141.3	65	53	-298	507	-107	592	150.2	24		53	-298	507	-107	592	150.2	24			
3	-99	450	31	512	178.4	-112	377	-8	411	167.2	80	61	-25	530	-10	534	180.0	29		61	-25	530	-10	534	180.0	29			
4	-156	484	-64	556	158.8	-103	419	2	440	167.3	57	54	-179	496	30	534	160.3	32		54	-179	496	30	534	160.3	32			
5	-265	633	98	712	158.5	-251	507	19	575	153.1	54	61	-323	574	-11	675	151.4	57		61	-323	574	-11	675	151.4	57			

CUMULATIVE MEANS

PEAKS										FOURIER COEFFICIENTS										I SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		3D	U	V	W	SPEED	TH	SP			
1	-145	485	-47	531	163.6	-243	299	0	410	139.9	60	52	-199	390	-25	519	164.2	33		52	-199	390	-25	519	164.2	33			
2	-190	467	19	535	157.4	-280	343	6	462	140.2	62	52	-224	420	-45	537	160.7	31		52	-224	420	-45	537	160.7	31			
3	-145	463	22	529	163.1	-234	352	2	448	147.6	67	55	-170	450	-36	536	166.0	30		55	-170	450	-36	536	166.0	30			
4	-162	470	-8	538	161.6	-188	376	2	445	154.5	63	54	-173	466	-12	535	164.0	31		54	-173	466	-12	535	164.0	31			
5	-186	513	19	564	160.8	-204	410	6	479	154.2	61	56	-212	494	-12	572	160.7	38		56	-212	494	-12	572	160.7	38			

ONE MINUTE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										I SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH			3D	U	V	W	SPEED	TH				
1	170	84	167	118	16.2	126	123	35	90	24.5	309	124	160	137	42.2					124	160	137	42.2						
2	141	384	247	220	39.0	145	54	4	133	7.4	122	54	54	108	7.6					54	54	108	7.6						
3	242	214	200	241	35.5	174	176	12	201	20.0	65	268	107	267	9.8					268	107	267	9.8						
4	176	198	163	103	27.5	102	62	18	70	13.4	94	101	78	105	9.6					94	101	78	105	9.6					
5	213	82	91	43	18.4	95	119	23	104	11.0	170	85	43	103	13.8					85	43	103	13.8						

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS										I SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH			3D	U	V	W	SPEED	TH				
1	170	84	167	118	16.2	126	123	35	90	24.5	309	124	160	137	42.2					124	160	137	42.2						
2	160	165	233	130	23.2	138	133	32	132	20.9	269	120	142	128	36.4					120	142	128	36.4						
3	192	169	215	153	26.9	159	137	28	144	23.4	245	164	129	160	32.0					164	129	160	32.0						
4	101	124	197	135	26.3	153	119	24	121	22.2	201	144	116	139	26.0					144	116	139	26.0						
5	164	170	180	141	24.2	141	130	25	128	19.6	201	138	101	143	23.8					138	101	143	23.8						

HEIGHT = 22.4  
 VAD 01154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 6:25:0  
 END TIME 6:30:0

ONE MINUTE MEANS

MTU	PEAKS			FOURIER COEFFICIENTS				SINE WAVE FIT				SP						
	U	V	W	TH	U	V	W	TH	20	30	U		V	W	TH			
1	-76	-5	89	77	85.4	-46	99	3	110	154.6	50	60	-4	4	-83	6	130.7	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE MEANS

MTU	PEAKS			FOURIER COEFFICIENTS				SINE WAVE FIT				SP						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D		3D	U	V	W	SPEED	TH
1	-76	-5	89	77	85.4	-46	99	3	110	154.6	50	60	-4	4	-83	6	130.7	1
2	-76	-5	89	77	85.4	-46	99	3	110	154.6	50	60	-4	4	-83	6	130.7	1
3	-76	-5	89	77	85.4	-46	99	3	110	154.6	50	60	-4	4	-83	6	130.7	1
4	-76	-5	89	77	85.4	-46	99	3	110	154.6	50	60	-4	4	-83	6	130.7	1
5	-76	-5	89	77	85.4	-46	99	3	110	154.6	50	60	-4	4	-83	6	130.7	1

ONE MINUTE STANDARD DEVIATIONS

MTU	PEAKS			FOURIER COEFFICIENTS						SINE WAVE FIT				TH	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W		SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MTU	PEAKS			I <sub>1</sub> FOURIER COEFFICIENTS				I SINE WAVE FIT				TH			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U		V	W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEIGHT = 43.  
 VAD 01154 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 6:25:0  
 END TIME 6:30:0

ONE MINUTE MEANS

PEAKS									
MIN	U	V	N	SPEED	TH	I	U	V	SP
1	-407	383	68	692	129.4	-240	427	18	497
2	-248	502	58	563	153.6	-155	423	25	454
3	-294	499	60	600	150.5	-128	385	-4	423
4	-294	510	22	608	149.0	-214	321	12	391
5	-335	499	142	614	146.0	-294	422	17	525
FOURIER COEFFICIENTS									
I	TH	2D	3D	U	V	N	SPEED	TH	SP
62	152.2	62	62	-197	366	-109	578	188.6	69
32	160.4	36	32	-179	526	-23	557	161.1	31
36	163.6	59	36	-282	510	26	643	153.2	51
40	147.0	30	40	-344	436	-8	574	141.4	42
61	145.3	57	61	-479	422	-7	663	130.2	62
SINE WAVE FIT									
I	TH	2D	3D	U	V	N	SPEED	TH	SP
62	152.2	62	62	-197	366	-109	578	188.6	69
32	160.4	36	32	-179	526	-23	557	161.1	31
36	163.6	59	36	-282	510	26	643	153.2	51
40	147.0	30	40	-344	436	-8	574	141.4	42
61	145.3	57	61	-479	422	-7	663	130.2	62

CUMULATIVE MEANS

PEAKS									
	U	V	N	SPEED	TH	U	V	N	SPEED
1	-407	383	68	692	129.4	-240	427	18	497
2	-327	443	63	628	141.5	-197	425	22	475
3	-313	464	61	614	145.2	-169	408	10	454
4	-309	477	51	614	146.2	-181	385	10	437
5	-315	482	70	614	146.1	-204	393	12	455

FOURIER COEFFICIENTS									
I	TH	2D	3D	U	V	W	SPEED	TH	SP
62	152.2	62	62	-197	366	-109	578	188.6	69
47	156.3	49	47	-188	446	-66	567	174.9	50
53	159.3	53	42	-227	472	-28	599	166.0	51
47	156.1	47	42	-258	463	-22	592	159.5	48
49	153.8	49	46	-303	454	-19	607	153.5	51

SINE WAVE FIT									
I	TH	2D	3D	U	V	W	SPEED	TH	SP
62	152.2	62	62	-197	366	-109	578	188.6	69
47	156.3	49	47	-188	446	-66	567	174.9	50
53	159.3	53	42	-227	472	-28	599	166.0	51
47	156.1	47	42	-258	463	-22	592	159.5	48
49	153.8	49	46	-303	454	-19	607	153.5	51

ONE MINUTE STANDARD DEVIATIONS

PEAKS									
	U	V	N	SPEED	TH	U	V	N	SPEED
1	144	424	88	62	43.0	123	101	12	131
2	60	61	87	60	6.1	73	58	21	74
3	175	76	70	84	16.8	143	91	41	110
4	116	126	60	69	15.1	146	55	16	80
5	130	106	127	86	13.3	111	100	20	94

FOURIER COEFFICIENTS									
I	TH	U	V	N	SPEED	TH	U	V	N
408	12.1	244	408	237	158	84.0			
32	7.2	37	32	34	37	3.4			
106	19.0	293	106	56	104	26.6			
125	9.3	103	125	38	42	15.7			
112	12.6	112	112	84	98	17.4			

SINE WAVE FIT									
I	TH	U	V	N	SPEED	TH	U	V	N
408	12.1	244	408	237	158	84.0			
32	7.2	37	32	34	37	3.4			
106	19.0	293	106	56	104	26.6			
125	9.3	103	125	38	42	15.7			
112	12.6	112	112	84	98	17.4			

CUMULATIVE STANDARD DEVIATIONS

PEAKS									
MIN	U	V	N	SPEED	TH	U	V	N	SPEED
1	166	424	88	62	43.0	123	101	12	131
2	145	295	83	82	31.6	105	78	17	102
3	153	224	76	84	26.3	123	83	12	106
4	142	204	73	81	23.6	114	85	24	102
5	138	187	92	80	21.7	121	88	24	106

FOURIER COEFFICIENTS									
I	TH	U	V	N	SPEED	TH	U	V	N
408	12.1	244	408	237	158	84.0			
165	10.3	165	285	166	109	57.9			
226	14.5	223	226	137	110	47.7			
203	14.2	203	202	119	97	42.8			
196	14.4	208	196	111	100	40.5			

SINE WAVE FIT									
I	TH	U	V	N	SPEED	TH	U	V	N
408	12.1	244	408	237	158	84.0			
165	10.3	165	285	166	109	57.9			
226	14.5	223	226	137	110	47.7			
203	14.2	203	202	119	97	42.8			
196	14.4	208	196	111	100	40.5			

HEIGHT = 43.

VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.

START TIME 6:30:0  
END TIME 6:35:0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
M/N	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-241	514	141	614	155.6	-178	487	30	525	160.6	67	51	-187	546	-43	606	161.7	43
2	-255	466	145	562	149.0	-149	426	12	474	158.7	64	51	-183	469	-46	523	158.4	38
3	-234	480	19	571	152.9	-173	335	19	403	151.6	53	31	-228	446	-14	536	152.3	47
4	-259	379	93	500	142.8	-278	318	18	430	138.9	37	30	-300	413	-10	517	144.1	42
5	-194	324	122	510	149.2	-214	200	0	339	122.9	65	61	-94	190	-125	478	144.1	43

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS						SINE WAVE FIT									
			I			TH			I			TH						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-241	514	141	614	155.6	-178	487	30	525	160.6	67	51	-187	546	-43	606	161.7	43
2	-247	492	143	590	152.5	-164	459	21	501	159.7	66	51	-185	510	-44	567	160.2	40
3	-243	488	100	583	152.7	-167	416	21	467	156.9	61	44	-200	488	-33	556	157.5	43
4	-247	463	98	564	150.4	-193	393	20	458	152.7	56	41	-223	471	-28	547	154.4	43
5	-240	444	101	557	150.2	-196	367	17	442	148.8	57	44	-206	433	-41	538	153.0	43

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT													
		I		TH		U		V		W		SPEED		TH		U		V		W		SPEED		TH	
M/N	U	J	N	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	230	120	131	66	25.7	107	118	28	137	8.8	187	115	109	94	20.6										
2	145	201	178	147	24.2	129	148	41	120	21.0	136	111	73	90	17.4										
3	172	147	31	66	22.5	126	97	33	47	22.6	177	113	25	54	21.7										
4	164	178	168	107	27.3	101	95	20	111	12.1	88	85	23	89	10.1										
5	283	279	130	69	51.8	37	221	19	109	37.8	491	185	171	175	70.8										

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS						SINE WAVE FIT							
		I	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
M/N	U														
1	230	120	131	66	25.7	107	118	28	137	8.8	187	115	109	94	20.6
2	183	157	148	102	24.2	113	131	35	127	14.9	159	115	90	98	18.5
3	179	150	133	95	23.0	115	132	33	115	17.8	162	116	74	85	19.5
4	172	160	138	102	23.9	119	130	30	113	18.2	153	112	66	86	18.5
5	185	180	135	99	27.7	112	155	30	118	23.2	217	155	89	101	28.7

HEIGHT = 28.

VAD OTIS

TIME IN GMT CT VAD

9/18/76

OTIS AIRFORCE

HD 90.

START TIME 6:30:0

END TIME 6:35:0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS						I						SINE WAVE FIT			SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH		
1	-96	129	-8	162	143.1	-90	-45	-1	102	63.3	31	55	-133	-75	11	154	60.5	34	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	-358	46	418	362	97.3	-256	517	16	578	153.6	90	79	-898	859	266	1244	133.7	60	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										I					SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP						
1	-96	129	-8	162	143.1	-90	-45	-1	102	63.3	31	55	-133	-75	11	154	60.5	34						
2	-96	129	-8	162	143.1	-90	-45	-1	102	63.3	31	55	-133	-75	11	154	60.5	34						
3	-96	129	-8	162	143.1	-90	-45	-1	102	63.3	31	55	-133	-75	11	154	60.5	34						
4	-227	87	204	262	120.2	-173	236	7	340	108.4	61	67	-516	392	139	699	97.1	47						
5	-227	87	204	262	120.2	-173	236	7	340	108.4	61	67	-516	392	139	699	97.1	47						

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS										FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH				
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4	1.95	59	302	141	32.4	117	398	13	336	43.8	541	661	180	770	51.8				
5	1.95	59	302	141	32.4	117	398	13	336	43.8	541	661	180	770	51.8				

HEIGHT # 2P. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 6:35: 0  
END TIME 6:40: 0

ONE MINUTE MEANS

MIF	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D			U	V	W
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	-162	-19	-5	164	82.8	67	88	3	111	217.3	49	73	-3	-18	-97	19	12.2
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE MEANS

MIF	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT					
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	-162	-19	-5	164	67	88	3	111	217.3	49	73	-3	-18	-97	19
3	-162	-19	-5	164	67	88	3	111	217.3	49	73	-3	-18	-97	19
4	-162	-19	-5	164	67	88	3	111	217.3	49	73	-3	-18	-97	19
5	-162	-19	-5	164	67	88	3	111	217.3	49	73	-3	-18	-97	19

ONE MINUTE STANDARD DEVIATIONS

MIF	PEAKS			I, FOURIER COEFFICIENTS			I			SINE WAVE FIT		
	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIF	PEAKS			I, FOURIER COEFFICIENTS			I SINE WAVE FIT			TH			
	U	V	W	TH	U	V	W	TH	U		V	W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0

HEIGHT = 42. VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 6:35:0 END TIME 6:40:0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT							
		U	V	A	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1		-384	348	329	555	130.9	-369	642	12	748	149.3	84	72	-320	737	-13	805	156.1	13
2		-291	524	51	611	151.2	-219	385	20	449	151.1	59	37	-305	525	6	620	149.4	45
3		-46	397	-293	403	170.5	-333	131	-37	359	111.4	71	55	-193	224	115	297	139.2	40
4		-223	515	49	564	156.5	-71	292	3	305	164.1	43	49	-272	451	21	528	148.9	60
5		-426	157	354	455	110.2	-285	396	12	489	144.1	94	85	-285	488	-7	566	149.6	121

CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-384	368	379	555	130.9	-369	642	12	748	149.3	84	72	-320	737	-13	805	156.1	13
2	-212	491	113	599	146.7	-253	442	18	516	150.7	64	45	-308	572	1	661	150.9	38
3	-267	481	72	579	149.1	-261	411	13	500	146.8	65	46	-297	538	13	624	149.7	38
4	-277	467	72	577	150.3	-229	391	11	468	149.6	61	47	-293	523	14	608	149.6	42
5	-288	462	94	567	147.2	-233	391	11	469	149.2	64	50	-292	520	12	605	149.6	48

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT														
		I		TH		U		V		W		SPEED		TH		U		V		W		SPEED		TH		
1	58	251	296	126	23.9	85	152	5	88	11.6	52	217	59	220	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
2	113	75	104	73	10.8	116	119	29	146	11.3	121	125	40	114	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	86	31	24	6	9.3	50	102	0	86	14.3	51	5	4	22	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

CUMULATIVE STANDARD DEVIATIONS

MIN		I, FOURIER COEFFICIENTS										SINE WAVE FIT																			
PEAKS		TH					W, SPEED					U				V				W				SPEED				TH			
1	58	251	296	126	23.9	85	152	5	88	11.6	52	217	59	220	2.9	2.9															
2	108	131	185	81	15.5	124	162	25	185	10.7	106	162	42	150	10.7	10.7															
3	128	127	216	99	16.4	119	182	30	182	16.0	107	188	53	182	10.7	10.7															
4	121	116	196	89	15.4	132	174	27	183	16.5	99	174	48	169	9.8	9.8															
5	123	144	203	92	18.5	127	166	26	175	15.9	94	167	47	162	9.4	9.4															

HEIGHT = 2P.  
 VAD OTIS4 TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 6:40: 0  
 END TIME 6:45: 0

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT				
	U	V	K	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	-100	119	9	156	139.6	35	101	1	107	198.9	32	77	100	182	1	208	208.8	16

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	K	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	-100	119	9	156	139.6	35	101	1	107	198.9	32	77	100	182	1	208	208.8	16

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS								SINE WAVE FIT			
MIN	U	V	K	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURIER COEFFICIENTS								SINE WAVE FIT			
MIN	U	V	K	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEIGHT = 41.  
START TIME 6:40:0  
END TIME 6:45:0

VAD OTIS4

TIME IN GMT CT VAD

9/18/76

OTIS AIRFORCE

HD 90.

# ONE MINUTE MEANS

MIN	I	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				
		V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	-508	607	93	642	161.0	-224	604	7	644	159.6	79	84	-108	618	-37	628	170.0	23
3	-244	440	19	536	149.0	-316	292	13	463	129.6	84	71	-475	190	29	644	118.5	52
4	-236	455	152	663	139.2	-271	454	20	571	149.2	55	55	-341	338	-133	548	132.2	40
5	-120	394	-117	415	164.2	-44	243	2	274	174.9	71	53	14	353	39	386	186.9	43

# CUMULATIVE MEANS

MIN	I	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT					
		U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	-208	607	93	642	161.0	-224	604	7	644	159.6	79	84	-108	618	-37	628	170.0	23	
3	-253	473	34	557	151.4	-297	354	12	499	135.6	83	74	-402	276	15	641	128.8	46	
4	-268	444	98	615	144.8	-283	409	16	538	143.0	68	64	-369	310	-65	590	130.7	43	
5	-251	445	41	561	149.9	-220	364	12	469	151.5	68	61	-266	321	-37	536	145.7	43	

# ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT						
	C	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	162	119	96	95	20.7	124	195	20	123	25.6	356	378	55	259	42.1
4	213	343	155	146	35.0	204	122	35	43	24.5	207	275	159	189	31.5
5	91	125	143	146	6.8	171	71	12	118	27.3	193	88	36	112	25.2

# CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	143	128	89	95	18.7	115	219	17	134	25.9	349	374	57	225	43.1
4	181	254	138	132	28.2	163	171	27	97	24.9	267	310	142	201	35.3
5	176	224	146	159	25.6	193	147	25	156	28.5	299	266	130	201	41.1

START TIME 7:20:0  
END TIME 7:25:0

HD 90.

OTIS AIRFORCE

9/18/76

TIME IN GAT CT VAD

OTIS

VAD

DELTA = 40.

# ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT									
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SPEED	TH	SP		
1	-92	644	63	660	176.6	-64	514	21	528	172.5	45	49	-91	622	-27	634	171.4	39
2	-94	601	42	636	174.5	-80	464	28	493	170.9	30	30	-84	608	-20	617	172.1	31
3	26	634	17	645	184.7	36	484	12	543	178.4	48	58	-87	590	0	757	173.1	51
4	-124	560	30	579	166.6	-30	419	15	431	176.0	37	26	-35	565	-17	575	176.3	27
5	-24	620	62	634	177.0	-74	494	47	507	177.4	31	21	-33	611	-25	631	176.7	46

# CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT							
	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP					
1	-92	644	63	660	176.6	-64	514	21	528	172.5	45	49	-91	622	-27	634	171.4	39
2	-96	621	52	647	175.4	-73	491	24	504	171.6	37	39	-87	615	-23	625	171.7	34
3	-23	645	41	659	178.4	-38	490	21	516	173.8	40	45	-87	607	-16	667	172.2	40
4	-44	609	38	640	175.6	-36	473	19	496	174.3	39	40	-75	597	-16	645	173.2	37
5	-44	614	43	640	175.9	-33	477	25	498	175.0	38	36	-66	600	-18	642	173.9	39

# ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I. FOURIER COEFFICIENTS				SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	156	24	74	45	12.9	82	81	30	77	9.3	88	58	22	52	8.3
2	203	107	47	73	20.9	104	80	28	49	11.3	63	57	12	57	5.8
3	263	143	54	100	25.0	216	223	48	171	35.4	460	268	39	151	40.1
4	67	75	75	70	7.3	105	53	30	50	14.5	111	37	24	36	11.1
5	122	63	53	61	11.0	118	53	24	45	14.2	169	50	19	49	15.4

# CUMULATIVE STANDARD DEVIATIONS

MIN	YEARS				I. FOURIER COEFFICIENTS								I SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	156	24	74	45	14.9	82	81	30	77	9.3	88	58	22	52	8.3	
2	176	41	59	61	17.0	91	81	28	43	10.0	73	56	17	54	6.8	
3	202	100	71	75	19.6	145	135	35	115	20.6	250	149	27	110	21.8	
4	184	98	70	80	18.1	135	123	33	106	19.1	223	131	26	105	19.7	
5	171	91	67	74	16.6	130	111	33	97	18.0	211	118	25	95	18.6	

HEIGHT = 43. VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HL 90. START TIME 7:20: 0 END TIME 7:25: 0

ONE MINUTE MEANS

PEAKS	FOURIER COEFFICIENTS				I SINE WAVE FIT				SP								
	U	V	W	SPEED	TH	U	V	W		SPEED	TH						
1	-54	662	22	685	175.2	-171	490	3	531	160.3	29	18	-165	615	-6	655	60
2	-139	679	-23	709	168.5	-111	519	0	537	167.9	26	23	-142	649	1	675	52
3	67	694	70	719	145.9	-34	540	30	558	177.2	27	16	-2	659	-29	669	53
4	-43	640	67	698	176.6	-25	544	14	562	177.1	19	21	-16	643	-22	662	46
5	-60	646	66	669	175.2	-66	550	25	557	173.1	19	18	-62	659	-32	663	36

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				TH	SP			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V			W	SPEED	
1	-54	662	22	685	175.2	-171	490	3	531	160.3	29	18	-165	615	-6	655	60
2	-93	670	1	696	172.1	-143	503	1	534	163.8	28	20	-154	631	-2	664	57
3	-44	679	23	703	176.4	-109	515	10	542	168.0	28	19	-106	640	-11	666	55
4	-42	679	35	707	176.5	-86	523	11	547	170.5	25	19	-83	641	-14	665	53
5	-44	673	40	696	176.2	-82	524	14	549	171.0	24	19	-79	644	-17	664	50

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	140	67	58	59	15.6	109	74	29	52	13.6	147	48	28	46	14.9
2	155	57	58	47	13.1	91	107	30	104	9.7	123	74	13	68	11.2
3	170	74	103	57	14.5	154	75	53	85	15.1	129	74	48	79	10.5
4	185	66	92	70	13.3	146	45	38	36	15.3	168	48	34	69	14.4
5	176	59	47	62	15.3	62	90	41	91	6.2	42	56	28	55	3.8

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	140	67	58	59	15.6	109	74	29	52	13.6	147	48	28	46	14.9
2	160	81	40	53	14.3	94	89	24	77	12.1	132	41	22	56	12.9
3	180	65	41	54	15.4	125	85	39	76	14.2	146	78	33	62	13.8
4	173	64	44	57	14.6	134	76	34	69	14.8	154	74	33	63	14.1
5	171	63	44	54	14.5	123	74	34	72	13.5	140	70	33	60	12.8

HEIGHT = 2m. VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90. START TIME 7:25:0 END TIME 7:30:0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										I					SINE WAVE FIT				
	U	V	W	TH	SP	TH	SP	TH	SP	TH	SP	TH	SP	TH	SP	TH	SP	TH	SP				
1	-40	632	62	637	176.4	-81	507	33	515	170.6	44	44	44	-64	616	-30	621	174.2	30				
2	-112	606	-14	623	169.5	-75	464	19	475	170.7	35	22	22	-108	595	1	606	169.7	28				
3	-151	591	44	614	166.1	-136	444	41	473	163.0	45	27	27	-171	571	-16	610	163.5	34				
4	-4	546	31	577	177.5	-72	433	5	458	167.6	48	44	44	-55	550	-14	570	173.6	20				
5	66	666	112	681	185.7	53	543	43	558	186.4	55	48	48	56	679	-55	686	185.1	23				

CUMULATIVE MEANS

PLATE'S				FOURIER COEFFICIENTS				SINE WAVE FIT										
MIN	U	V	W	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-40	632	62	637	176.4	-81	507	33	515	170.6	44	44	-64	616	-30	621	174.2	30
2	-77	616	41	629	172.7	-78	486	26	494	170.7	39	32	-88	605	-13	613	171.8	29
3	-102	607	24	624	170.6	-76	473	30	487	168.3	41	31	-114	584	-14	612	169.1	31
4	-84	598	27	616	172.1	-92	466	26	482	168.1	42	33	-104	586	-14	605	169.9	29
5	-47	614	50	631	175.3	-58	484	30	500	172.4	45	37	-66	608	-24	624	173.5	27

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS			I SINE WAVE FIT							
	U	V	W	TH	U	V	W	TH	U	V	W	SPEED	TH	
1	75	46	26	47	6.7	38	52	16	49	4.7	53	41	20	45
2	94	28	50	31	8.9	26	53	25	52	3.3	28	26	24	28
3	85	86	86	94	7.4	97	71	32	75	11.0	138	76	21	71
4	218	73	45	67	22.0	132	134	9	119	19.0	155	68	10	57
5	131	74	46	68	11.3	121	115	24	112	12.8	88	63	24	60

CUMULATIVE STANDARD DEVIATIONS

I. FOURIER COEFFICIENTS																			
PEAKS																			
SINE WAVE FIT																			
MIN	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH	SP	U	V	W	TH
1	75	46	26	47	6.7	38	52	16	49	4.7	53	41	20	45	4.5	45	41	20	45
2	93	34	56	38	8.5	31	54	22	53	3.8	45	34	27	36	4.1	36	34	27	36
3	95	56	65	54	8.5	63	61	26	59	7.5	91	52	25	48	8.7	48	52	25	48
4	123	63	62	62	11.7	76	77	25	70	4.8	103	56	23	51	10.0	51	56	23	51
5	134	70	64	66	12.9	106	91	26	46	13.0	120	69	29	63	11.4	63	69	29	63

HEIGHT = 43. VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 7:25:0 END TIME 7:30:0

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			SP					
	U	V	W	TH	U	V	W	TH	U	V	W	TH						
1	-80	635	70	655	172.6	-21	525	58	531	176.9	23	18	-50	630	-36	637	175.1	29
2	-70	597	-23	616	172.5	-28	447	-12	457	177.2	26	19	-17	581	3	589	178.4	58
3	-146	539	19	579	165.0	-162	397	4	435	158.0	23	21	-173	512	-7	552	161.5	51
4	7	655	-4	672	180.8	-16	539	-1	551	178.6	23	18	-8	671	7	680	179.3	46
5	20	677	103	593	181.6	48	577	54	587	184.4	15	15	61	658	-47	666	185.1	44

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D			U	V	W	SPEED
1	-80	635	70	655	172.6	-21	525	58	531	176.9	23	18	-50	630	-36	637	175.1	29
2	-76	618	27	637	172.5	-24	489	25	497	177.1	24	19	-35	607	-18	615	176.6	42
3	-100	590	24	616	169.9	-72	457	18	475	170.4	24	20	-83	574	-14	593	171.3	45
4	-75	605	17	629	172.4	-59	475	13	493	172.3	24	19	-66	596	-9	613	173.2	46
5	-57	619	33	641	174.1	-39	494	21	510	174.6	22	18	-42	608	-16	623	175.4	45

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			SINE WAVE FIT			TH					
	U	V	W	SPEED	TH	U	V	W	SPEED		TH	U	V	W	SPEED
1	145	37	51	33	12.8	78	59	33	55	8.9	92	33	20	32	8.2
2	147	81	87	79	13.4	106	64	28	69	12.8	104	80	29	85	9.5
3	160	66	44	61	16.3	83	59	33	61	11.1	114	52	17	39	12.9
4	154	83	75	74	14.5	129	64	40	63	13.9	119	77	35	73	10.5
5	160	94	43	90	13.6	106	105	17	102	11.0	86	90	19	90	7.6

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			SINE WAVE FIT			TH					
	U	V	W	TH	U	V	W	TH	U		V	W	SPEED		
1	145	37	51	33	12.8	78	59	33	55	8.9	92	33	20	32	8.2
2	140	62	43	60	12.5	48	71	48	71	10.4	95	62	31	64	8.6
3	147	73	70	65	14.0	108	79	43	72	13.9	120	74	27	64	12.4
4	154	79	71	70	14.6	113	83	43	76	14.1	122	84	30	75	12.3
5	157	85	74	77	14.7	118	95	42	88	14.2	125	87	32	79	12.4

HEIGHT = 24.  
START TIME 7:30: 0  
END TIME 7:35: 0

HD 90.

OTIS AIRFORCE

9/18/76

CT VAD

VAD OTISS

TIME IN GMT

OT

# ONE MINUTE MEANS

FOURIER COEFFICIENTS									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	-26	572	58	646	180.1	-86	534	20	561
2	174	627	46	652	195.8	87	486	28	498
3	-105	659	69	680	171.4	-33	568	58	570
4	51	695	69	708	144.2	-5	542	23	585
5	135	722	65	808	120.0	154	634	19	668

## SINE WAVE FIT

I

20

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

# CUMULATIVE MEANS

FOURIER COEFFICIENTS									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	-26	572	58	646	180.1	-86	534	20	561
2	73	599	52	649	187.9	0	512	24	530
3	7	621	59	661	181.8	-11	532	37	544
4	17	639	61	672	182.4	-10	542	33	554
5	40	669	62	698	183.9	21	560	31	576

## SINE WAVE FIT

I

20

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

B-114

# ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	298	159	49	76	33.0	143	67	30	66
2	34	94	35	90	3.8	81	107	20	111
3	146	56	61	65	12.3	42	75	32	76
4	133	72	75	63	11.4	136	77	17	80
5	81	75	70	58	6.9	132	112	41	77

## SINE WAVE FIT

I

106

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

# CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	298	159	49	76	33.0	143	67	30	66
2	224	128	41	79	23.9	143	89	25	93
3	217	109	44	74	21.6	116	87	32	87
4	190	105	54	73	19.4	114	85	29	85
5	166	116	56	69	17.7	136	96	32	94

## SINE WAVE FIT

I

106

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

TH

U

V

W

SPEED

START TIME 7:30: 0  
END TIME 7:35: 0

HD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

OTIS

VAD

HEIGHT = 43.

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				SP
						I	U	V	W	I	U	V	W	
1	-130	541	32	630	162.9	-62	462	4	496	171.7	32	19	-58	584
2	117	566	4	607	194.8	35	470	13	478	162.3	20	20	71	564
3	3	721	92	233	180.1	-26	556	34	562	177.9	34	14	-27	707
4	34	687	67	696	182.7	45	435	5	479	168.3	36	29	83	582
5	-17	622	76	829	178.7	114	639	43	645	190.9	23	21	126	781
														55
														55
														43
														55
														70
														55

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				SP
						I	U	V	W	I	U	V	W	
1	-130	541	32	630	162.9	-62	462	4	496	171.7	32	19	-58	584
2	-15	552	19	619	177.6	-17	466	9	487	176.6	26	19	1	575
3	-4	606	42	655	178.4	-20	494	17	511	177.0	29	19	-7	636
4	1	625	48	665	179.4	-4	481	14	508	179.7	31	22	14	608
5	-2	668	54	701	179.3	21	515	20	543	182.2	29	22	38	646
														55
														55
														49
														51
														56
														56

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				TH
						I	U	V	W	I	U	V	W	
1	257	199	103	56	32.4	173	58	54	21	21.5	192	87	37	27
2	154	178	38	121	23.0	81	115	30	114	11.6	104	109	21	104
3	138	69	32	60	11.5	82	62	21	65	8.3	116	51	16	41
4	117	60	60	53	10.2	255	114	26	49	31.8	298	104	32	44
5	117	47	66	44	8.3	143	94	45	74	13.8	160	108	33	63
														20.5
														13.0
														9.9
														28.9
														13.6

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				TH
						I	U	V	W	I	U	V	W	
1	257	199	103	56	32.4	173	58	54	21	21.5	192	87	37	27
2	244	182	79	88	31.9	143	85	43	75	17.9	166	94	30	73
3	212	173	75	96	26.8	124	84	39	79	15.2	149	103	24	84
4	192	156	71	88	23.7	161	94	36	80	20.2	192	102	29	76
5	177	162	70	105	21.2	163	116	39	102	19.4	189	125	31	101
														20.5
														17.8
														15.5
														19.3
														18.4

HEIGHT = 28.

VAD OTISS

TIME IN GMT CT VAD

9/18/76

OTIS AIRFORCE

HD 90.

START TIME 7:35: 0  
END TIME 7:40: 0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				SP					
						I	U	V	W	TH	20	30	U		V	W	SPEED	TH	
1	95	802	100	314	186.8		65	689	60	697	185.4	21	23	76	796	-47	802	185.4	26
2	24	743	74	749	181.9		-1	638	67	641	179.5	20	15	-3	742	-40	744	179.7	22
3	-124	644	55	709	169.7		115	566	33	583	192.0	21	18	83	675	-32	684	187.4	44
4	-2	596	40	605	180.2		22	515	44	524	183.1	17	14	23	595	-45	603	182.3	31
5	-93	643	105	659	172.1		-31	540	48	550	176.8	20	13	-35	620	-42	628	176.8	35

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				SINE WAVE FIT				SP					
						I	U	V	W	SPEED	TH	20	30		U	V	W	SPEED	TH
1	95	802	100	314	185.8		65	689	60	697	185.4	21	23	76	796	-47	802	185.4	26
2	62	775	184	784	184.5		34	665	63	671	182.7	20	19	39	771	-44	775	182.8	24
3	2	746	78	760	179.8		60	634	54	643	185.6	21	19	53	741	-40	747	184.2	30
4	1	711	74	723	179.9		51	605	52	615	185.0	20	18	46	706	-41	712	183.8	30
5	-19	696	84	709	178.2		32	591	51	600	183.2	20	17	28	687	-41	694	182.3	31

ONE MINUTE STANDARD DEVIATIONS

PEAKS			I, FOURIER COEFFICIENTS					SINE WAVE FIT					TH		
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	102	42	31	33	7.5	84	44	34	42	7.1	61	35	11	32	4.6
2	96	25	53	43	7.6	74	54	18	52	6.9	58	26	17	26	4.4
3	134	80	88	73	12.2	82	79	26	68	8.9	69	82	22	76	6.3
4	96	61	54	54	9.6	100	74	34	73	11.1	104	64	22	61	10.2
5	114	61	78	68	10.1	109	45	42	47	11.3	99	50	32	51	9.0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				TH	FOURIER COEFFICIENTS				TH	SINE WAVE FIT				TH
	U	V	W	SPEED		U	V	W	SPEED		U	V	W	SPEED	
1	102	42	31	33	7.5	84	44	34	42	7.1	61	35	11	32	4.6
2	103	46	43	43	7.7	84	54	27	53	7.4	71	41	14	41	5.2
3	144	71	63	63	11.4	90	77	30	70	8.8	71	71	17	68	5.9
4	132	93	58	91	10.8	92	91	30	87	9.2	79	93	18	91	6.9
5	134	91	62	90	11.0	100	87	32	84	10.1	89	92	21	90	7.8

HEIGHT = 43. VAD OTIS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE MD 90. START TIME 7:35:0 END TIME 7:40:0

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS					I					SINE WAVE FIT				
MIN	U	V	W	TH	SPEED	TH	U	V	W	SPEED	TH	2U	3D	U	V	W	SPEED	TH	SP					
1	54	637	36	640	183.7	88	597	39	654	192.7	31	28	28	143	738	-12	829	194.2	59					
2	-29	723	49	732	177.9	2	574	2	583	180.5	23	19	19	42	717	-16	721	183.4	53					
3	4	674	67	706	180.8	76	565	17	576	187.8	24	21	21	83	666	-23	674	187.1	49					
4	52	677	107	678	183.8	-6	525	40	552	180.5	22	23	23	0	623	-41	650	179.8	49					
5	5	643	50	652	180.6	3	471	33	485	181.1	26	18	18	24	613	-26	628	182.6	57					

CUMULATIVE MEANS

PEAKS																		
MIN	U	V	W	TH	I	FOURIER COEFFICIENTS	I	SINE WAVE FIT	SP									
1	54	637	38	640	183.7	88	597	39	654	192.7	31	28	143	738	-12	829	194.2	59
2	12	780	43	786	180.8	45	544	21	619	186.6	27	23	93	728	-14	775	188.8	56
3	9	748	52	756	180.8	56	579	19	603	187.1	26	23	89	705	-17	738	188.2	54
4	19	724	56	738	181.5	41	566	24	591	185.5	25	23	67	685	-23	717	186.1	53
5	17	708	63	721	181.3	34	548	26	570	184.6	25	22	59	671	-24	699	185.5	53

B-117

ONE MINUTE STANDARD DEVIATIONS

PEAKS																	
I. FOURIER COEFFICIENTS																	
I. SINE WAVE FIT																	
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	56	63	43	61	4.0	190	231	52	115	29.4	282	266	58	66	29.7		
2	126	45	34	48	9.7	89	48	26	49	8.7	63	50	4	51	4.9		
3	140	70	50	70	11.5	88	38	31	30	9.2	71	64	21	64	6.0		
4	219	54	26	71	16.1	190	87	29	98	18.9	205	45	17	49	18.0		
5	114	66	84	65	10.1	126	87	49	87	15.1	146	60	32	54	13.7		

CUMULATIVE STANDARD DEVIATIONS

PEAKS										I, FOURIER COEFFICIENTS					I, SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH				
1	56	63	43	61	4.0	190	231	52	115	29.4	282	266	58	68	29.7				
2	103	74	37	77	7.7	148	154	44	92	21.7	202	183	39	80	21.0				
3	119	85	61	83	9.0	128	127	39	77	17.8	163	151	33	88	16.8				
4	142	89	59	86	11.4	143	119	37	43	17.9	174	137	31	84	17.1				
5	135	90	65	88	11.0	134	119	39	93	17.2	167	128	31	84	16.4				

HEIGHT = 28.  
 VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HQ 90.  
 START TIME 7:40: 0  
 END TIME 7:45: 0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	J		I		K		L		M		U	V	W	SPEED	TH	SP
			TH	U	TH	U	V	W	TH	U	TH	U						
1	43	529	-31	538	184.9	18	455	3	458	182.0	26	21	26	514	10	519	182.9	47
2	215	673	83	721	197.4	214	571	49	617	200.4	19	15	239	654	-31	703	199.9	44
3	136	730	116	752	190.3	105	645	53	664	189.0	14	13	122	699	-42	718	189.7	43
4	83	571	35	605	188.5	86	514	17	532	189.6	10	12	69	573	-8	592	187.5	37
5	135	515	32	557	194.7	115	463	26	492	193.9	16	13	141	526	-15	551	195.2	43

CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT							
	I					I					I							
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SP	TH	SP		
1	43	529	-31	558	184.9	18	455	3	458	182.0	26	21	26	514	10	519	182.9	47
2	121	594	21	621	190.6	107	507	23	530	190.4	23	18	122	578	-8	602	190.6	46
3	127	647	53	672	190.5	106	561	35	542	189.8	19	16	122	625	-21	647	190.3	45
4	117	630	53	658	190.1	102	551	31	571	189.8	17	15	111	614	-19	635	189.7	43
5	121	607	50	657	191.0	104	533	30	553	190.6	17	15	117	595	-18	618	190.8	43

ONE MINUTE STANDARD DEVIATIONS

PEAKS	I, FOURIER COEFFICIENTS										I SINE WAVE FIT				
	U		V		W		TH		U		V		W		TH
1	95	58	84	56	10.3	59	50	16	51	7.2	73	48	17	49	7.9
2	162	76	67	72	13.2	107	67	31	60	10.5	104	73	26	72	8.7
3	134	41	60	52	9.9	126	45	16	49	10.8	122	38	21	41	9.8
4	177	92	35	77	19.8	119	37	9	33	13.0	148	66	13	62	14.3
5	162	50	67	14	17.7	77	56	38	51	9.7	86	49	23	31	9.8

CUMULATIVE STANDARD DEVIATIONS

PEAKS	FOURIER COEFFICIENTS											SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	95	58	84	56	10.3	59	51	16	51	7.2	73	48	17	49	7.9
2	152	94	95	113	12.8	130	82	33	98	12.7	139	93	29	112	11.8
3	142	104	94	113	11.5	125	97	31	105	11.7	129	97	31	107	10.8
4	151	105	85	108	13.2	121	87	28	96	11.7	132	92	28	100	11.3
5	151	106	80	105	14.0	112	91	30	95	11.3	123	92	27	96	11.1

HEIGHT = 43.

VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HQ 90.

START TIME 7:40:0  
END TIME 7:45:0

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP	
1	34	558	8	570	183.9	41	384	26	433	189.8	31	23	69	481	-7	539	192.0	56
2	181	758	77	783	193.2	145	610	23	628	193.4	18	18	226	724	-29	760	197.3	37
3	136	658	109	695	191.6	26	545	37	542	180.7	22	21	33	641	-29	685	181.2	50
4	87	576	45	643	194.6	-9	474	-5	448	179.7	34	19	-15	594	-13	607	179.2	65
5	87	638	83	649	188.0	87	469	20	508	189.9	24	21	135	576	-18	608	192.8	52

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS										SINE WAVE FIT						
MIN	U	V	W	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	34	558	8	570	183.9	41	384	26	433	189.8	31	23	69	481	-7	539	192.0	56		
2	102	651	40	668	188.2	89	489	25	523	191.5	25	21	142	593	-17	641	194.4	47		
3	113	653	61	676	189.3	69	506	29	542	188.1	24	21	107	608	-21	655	190.3	48		
4	107	634	54	668	190.6	50	499	20	529	186.0	26	20	78	605	-19	643	187.6	52		
5	103	634	63	664	190.0	58	496	20	524	186.9	26	21	90	599	-19	636	188.8	52		

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	111	98	96	91	12.1	175	152	28	99	31.4	200	183	18	104	30.8
2	84	59	66	68	5.7	41	89	60	89	3.6	53	42	23	44	3.8
3	189	40	72	24	16.1	218	97	40	84	23.5	256	83	38	57	23.3
4	219	242	56	130	31.9	133	102	34	108	14.8	141	98	12	106	12.6
5	114	56	68	52	10.3	114	65	34	65	13.2	149	30	25	31	14.3

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS								SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	111	98	96	91	12.1	175	152	28	99	31.4	200	183	18	104	30.8	
2	122	131	44	134	10.5	138	169	44	136	22.4	167	167	23	139	22.1	
3	142	109	88	112	12.2	164	150	42	123	22.7	199	157	28	119	22.7	
4	159	149	81	115	18.1	158	139	42	120	21.1	191	143	25	116	21.0	
5	149	133	76	104	16.6	149	125	40	109	19.5	182	127	25	104	19.7	

HEIGHT = 28. VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90. START TIME 7:45:0 END TIME 7:50:0

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED		TH
1	30	525	22	544	182.7	35	454	28	463	184.4	23	18	55	514	-19	528	186.0	42
2	214	718	82	765	196.9	165	507	21	548	197.6	45	24	173	742	-29	768	193.6	32
3	-56	761	121	770	175.7	-34	626	59	646	176.8	35	29	-11	776	-61	782	179.0	26
4	45	654	46	695	185.0	-31	531	34	538	177.0	31	33	-44	678	-32	693	176.6	41
5	119	655	55	673	190.3	58	561	58	571	185.9	15	16	76	659	-43	668	186.5	33

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W		SPEED	TH
1	30	525	22	544	182.7	35	454	28	463	184.4	23	18	55	514	-19	528	186.0	42
2	122	621	54	655	189.8	100	480	25	505	191.0	34	21	114	628	-24	648	189.8	37
3	63	668	77	693	185.1	55	527	36	552	186.3	34	24	72	677	-36	692	186.2	33
4	58	665	69	694	185.1	33	527	36	549	184.2	34	26	43	677	-35	693	183.8	35
5	77	662	75	689	186.2	39	536	41	554	184.6	29	24	50	673	-37	687	184.4	35

B-120

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
			W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH			
1	153	37	72	41	16.1	93	25	32	29	11.3	119	38	30	42	12.6			
2	161	91	75	66	13.2	137	59	27	56	14.4	92	108	56	91	8.5			
3	109	53	64	47	8.5	171	55	46	51	15.3	103	51	29	46	7.9			
4	233	136	67	97	22.4	83	139	31	136	10.8	151	74	13	69	13.0			
5	104	64	61	59	9.3	90	72	30	71	9.4	84	52	31	52	7.4			

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
			W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH			
1	153	37	72	41	16.1	93	25	32	29	11.3	119	38	30	42	12.6			
2	178	120	77	127	15.9	131	51	28	61	14.1	118	142	44	143	11.0			
3	178	122	80	119	15.2	155	87	38	89	15.7	126	138	42	134	11.1			
4	187	124	77	112	16.8	144	99	36	99	14.9	139	123	37	120	12.1			
5	173	111	73	102	15.4	133	94	35	93	13.7	128	111	35	108	11.1			

HEIGHT = 43.  
 VAD OTISS TIME IN GHT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
 START TIME 7:45: 0  
 END TIME 7:50: 0

ONE MINUTE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	126	620	47	647	191.1	-20	476	7	498	175.7	22	16	8	568	179.8	52
2	116	616	116	637	187.3	57	623	23	640	185.4	31	26	173	821	192.0	41
3	86	636	47	646	185.9	56	724	58	732	184.4	11	16	66	842	184.5	24
4	90	719	53	727	187.1	65	602	41	607	186.3	13	17	42	701	183.5	37
5	-51	601	81	693	175.6	60	523	32	538	186.4	28	23	51	663	184.9	51

CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP
1	126	620	47	647	191.1	-20	476	7	498	175.7	22	16	8	568	179.8	52
2	116	716	21	742	189.2	18	550	15	569	180.6	26	21	90	694	185.9	47
3	104	762	67	760	188.0	32	614	31	629	182.0	21	19	81	749	185.4	38
4	101	751	79	767	187.8	40	611	33	624	183.0	19	19	72	737	184.9	38
5	71	736	79	753	185.4	44	594	33	607	183.7	21	19	68	735	184.9	40

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	154	40	77	101	12.8	157	86	36	81	18.7	164	90	20	85	16.8
2	162	37	48	24	11.4	145	62	37	59	13.1	79	48	37	39	5.7
3	107	64	65	60	7.5	101	27	36	32	7.8	81	45	20	44	5.6
4	68	42	34	40	5.5	46	74	28	72	4.9	14	47	17	47	1.3
5	129	31	80	24	10.9	121	45	41	40	13.1	111	56	17	42	10.3

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	154	40	77	101	12.8	157	86	36	81	18.7	164	90	20	85	16.8
2	151	122	71	171	11.7	150	105	36	100	16.2	150	149	37	147	13.6
3	134	118	68	114	10.3	132	120	41	114	13.6	127	140	34	135	11.1
4	120	105	62	103	9.2	117	110	38	104	12.1	112	125	31	122	9.7
5	135	99	65	97	10.6	116	106	38	101	12.2	110	118	30	114	9.6

HEIGHT \* 40.  
 VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HQ 90.  
 START TIME 7:50:0  
 END TIME 7:55:0

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT																																																	
J					I					I																																																	
PEAKS					TH					3D					U					V					W					SPEED					TH					SP																			
MIN					U					V					W					TH					3D					U					V					W					SPEED					TH					SP				
1	1	1	1	1	16	582	175.7	12	445	25	459	181.7	18	23	9	560	-13	570	47	180.6																																							
2	2	2	2	125	693	42	705	51	595	43	600	184.8	18	14	51	692	-38	695	39	184.4																																							
3	3	3	3	59	647	125	691	54	579	64	596	186.5	19	14	82	658	-48	677	39	187.9																																							
4	4	4	4	9	650	93	667	31	569	66	572	183.2	12	12	27	661	-50	664	25	182.4																																							
5	5	5	5	6	590	53	595	-40	514	42	522	175.6	16	11	-37	577	-25	584	28	176.3																																							

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT								
PEAKS					I					I					TH		SP	
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH	SP	
1	-41	555	16	582	175.7	12	445	25	459	181.7	18	23	9	560	-13	570	180.6	47
2	42	624	49	644	183.0	31	520	34	529	183.3	18	19	30	626	-26	632	182.5	43
3	98	647	77	661	183.7	40	542	45	554	184.5	18	17	49	638	-34	649	184.5	42
4	39	648	81	662	183.0	38	548	50	558	184.2	17	16	44	643	-38	652	184.0	38
5	32	635	75	648	182.5	21	541	48	550	182.3	17	15	26	629	-35	637	182.3	35

ONE MINUTE STANDARD DEVIATIONS

I. FOURIER COEFFICIENTS																	I SINE WAVE FIT				
PEAKS																					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH						
1	187	30	55	25	18.7	116	58	24	48	16.0	114	36	11	32	11.8						
2	30	50	57	46	2.9	55	66	44	67	5.1	38	48	27	45	3.5						
3	49	77	52	78	3.8	126	99	37	80	14.3	135	103	29	85	12.9						
4	149	40	60	41	14.0	57	86	31	86	5.6	65	47	24	47	5.7						
5	83	44	47	41	8.2	87	41	30	42	9.6	85	28	21	28	8.4						

CUMULATIVE STANDARD DEVIATIONS

PLATE 5																	
I. FOURIER COEFFICIENTS																	
I. SINE WAVE FIT																	
MIN		U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	187	30	55	25	18.7	118	58	26	48	16.0	114	36	11	32	11.8		
2	155	82	63	73	14.9	90	99	36	92	11.5	84	80	24	75	8.6		
3	124	44	49	49	11.9	102	100	39	92	12.3	105	88	27	80	10.3		
4	132	75	66	69	12.2	92	96	34	89	10.9	96	80	27	72	9.4		
5	123	73	63	69	11.3	96	84	34	82	11.1	99	76	26	71	9.6		

HEIGHT = 43.  
 START TIME 7:50:0  
 END TIME 7:55:0

VAD OTISS TIME IN GMT CT VAD 9/18/76 OTIS AIRFORCE HD 90.

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				SP	
	U	V	W	TH	U	V	W	TH	U	V	W	TH		
1	93	661	22	679	187.7	49	517	2	531	186.2	23	20	70	43
2	63	677	93	694	185.9	56	563	21	574	186.1	21	18	59	50
3	102	680	105	695	189.0	-50	525	22	548	173.9	27	21	-28	59
4	113	634	107	659	189.9	-8	569	51	574	179.2	17	14	15	40
5	-1	607	34	614	179.9	-44	499	33	511	174.5	20	15	-15	40

CUMULATIVE MEANS

min	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH				
1	93	661	22	679	187.7	49	517	2	531	186.2	23	20	70	634	-9	643	186.3	43
2	79	668	55	686	186.8	52	538	11	551	186.2	22	19	65	650	-18	660	185.9	46
3	87	672	71	689	187.5	20	534	14	550	182.3	23	20	35	646	-17	659	183.0	50
4	94	663	81	681	188.2	12	544	24	556	181.5	22	18	30	644	-22	655	182.6	47
5	76	653	73	668	186.6	1	535	26	548	180.2	21	18	21	631	-23	641	181.8	46

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	135	34	59	43	11.3	115	69	43	58	13.3	91	41	28	41	8.2
2	142	94	67	70	13.7	103	56	40	50	10.5	112	61	26	53	10.0
3	100	37	30	72	7.4	162	77	53	74	17.4	167	111	21	101	15.8
4	122	76	47	74	11.0	77	50	43	48	7.9	70	62	28	63	6.2
5	95	50	52	51	8.8	109	36	34	24	12.8	108	52	18	47	11.0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	135	34	59	43	11.3	115	69	43	58	13.3	91	41	28	41	8.2
2	133	66	67	55	11.9	105	65	41	57	11.6	97	52	28	49	8.7
3	127	71	62	59	11.0	130	67	44	61	14.4	127	73	25	67	11.8
4	120	72	59	63	10.8	118	64	46	58	12.9	113	69	27	65	10.5
5	120	72	60	66	10.8	117	62	43	56	13.0	112	71	25	67	10.5

HEIGHT = 26.  
 START TIME 7:55:0  
 END TIME 8:01:0

MD 90.

OTIS AIRFORCE

9/18/76

CT VAD

TIME IN GMT

VAD OTIS

ONE MINUTE MEANS

ONE MINUTE MEANS									
FOURIER COEFFICIENTS									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	-6	590	146	602	179.3	35	493	64	505
2	-8	571	58	576	179.3	-2	516	38	520
3	91	502	64	529	189.4	-4	424	31	440
4	-37	569	74	572	176.3	20	495	16	495
5	200	664	73	644	196.8	95	662	19	668
SINE WAVE FIT									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	-6	590	146	602	179.3	35	493	64	505
2	-8	571	58	576	179.3	-2	516	38	520
3	91	502	64	529	189.4	-4	424	31	440
4	-37	569	74	572	176.3	20	495	16	495
5	200	664	73	644	196.8	95	662	19	668

CUMULATIVE MEANS

CUMULATIVE MEANS									
FOURIER COEFFICIENTS									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	-6	590	146	602	179.3	35	493	64	505
2	-7	580	98	588	179.3	15	505	50	513
3	23	555	88	570	182.5	9	480	44	490
4	15	557	84	570	181.6	10	482	40	491
5	23	562	85	575	182.3	14	490	39	499
SINE WAVE FIT									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	-6	590	146	602	179.3	35	493	64	505
2	-7	580	98	588	179.3	15	505	50	513
3	23	555	88	570	182.5	9	480	44	490
4	15	557	84	570	181.6	10	482	40	491
5	23	562	85	575	182.3	14	490	39	499

ONE MINUTE STANDARD DEVIATIONS

ONE MINUTE STANDARD DEVIATIONS									
FOURIER COEFFICIENTS									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	132	40	59	48	12.1	106	81	48	67
2	103	39	38	41	8.2	71	26	13	28
3	163	40	54	60	17.0	108	94	34	78
4	57	28	41	28	5.7	10	5	37	4
5	0	0	0	0	0.0	0	0	0	0
SINE WAVE FIT									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	132	40	59	48	12.1	106	81	48	67
2	103	39	38	41	8.2	71	26	13	28
3	163	40	54	60	17.0	108	94	34	78
4	57	28	41	28	5.7	10	5	37	4
5	0	0	0	0	0.0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

CUMULATIVE STANDARD DEVIATIONS									
FOURIER COEFFICIENTS									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	132	40	59	48	12.1	106	81	48	67
2	103	39	65	45	9.7	87	57	35	48
3	129	54	64	56	12.9	91	79	35	67
4	123	51	60	52	12.3	85	74	36	62
5	126	54	59	57	12.4	85	81	35	71
SINE WAVE FIT									
I									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED
1	132	40	59	48	12.1	106	81	48	67
2	103	39	65	45	9.7	87	57	35	48
3	129	54	64	56	12.9	91	79	35	67
4	123	51	60	52	12.3	85	74	36	62
5	126	54	59	57	12.4	85	81	35	71

HEIGHT = 43.

VAD OTISS TIME IN GHT CT VAD 9/18/76 OTIS AIRFORCE HD 90.  
START TIME 7:55:0  
END TIME 8:0:0

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	SP
1	76	590	90	603	188.2	38	459	34	479	186.5	28	23	79	568	-28	593	189.3	46
2	43	589	70	595	184.5	-51	470	25	477	173.8	29	17	-35	581	-16	585	176.4	39
3	-7	573	78	576	179.3	44	462	27	469	186.1	24	18	45	560	-25	566	185.0	43
4	112	577	112	625	192.1	-71	539	24	549	173.1	37	38	22	598	-56	603	182.5	21
5	76	647	80	693	186.1	75	555	20	576	189.2	56	39	131	671	-26	695	191.2	30

CUMULATIVE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W			SPEED
1	76	590	90	603	188.2	38	459	34	479	186.5	28	23	79	568	-28	593	189.3	46
2	61	589	81	599	186.4	-3	464	30	478	180.6	29	20	26	574	-23	589	183.3	43
3	37	584	80	591	183.9	13	463	29	475	182.6	27	20	33	569	-24	581	183.9	43
4	54	582	87	599	185.8	-6	481	28	492	180.4	29	24	30	576	-31	586	183.6	38
5	58	594	86	616	185.9	9	495	26	508	182.0	34	27	49	594	-30	607	185.0	36

B 125

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS					I, SINE WAVE FIT						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	97	87	63	76	10.1	134	96	41	79	17.8	144	106	28	71	16.8
2	76	61	29	55	8.0	72	49	33	52	8.2	68	36	6	35	6.8
3	62	42	70	44	6.1	63	68	40	61	8.8	74	62	25	56	8.1
4	177	136	67	67	22.6	82	61	34	66	8.5	76	56	38	52	7.6
5	256	54	118	45	21.9	129	106	45	86	15.0	129	43	34	28	11.0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I <sub>1</sub>			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED		
1	97	87	63	76	10.1	134	96	41	79	17.8	144	106	28	71	16.8	
2	86	73	49	65	9.0	115	75	36	65	15.2	126	79	21	55	14.3	
3	84	63	56	54	8.7	101	71	37	62	13.3	109	72	22	55	12.3	
4	119	82	59	61	13.1	102	75	36	69	12.9	101	68	29	54	11.3	
5	149	81	71	68	14.7	110	85	37	79	13.5	112	74	30	66	11.5	

Appendix C

TABULAR DATA FOR WIND MEASURED IN LOW  
CLOUD CONDITIONS AT LOCKHEED MISSILES  
& SPACE COMPANY, HUNTSVILLE,  
ALABAMA, ON 7 DECEMBER 1976

START TIME 9:45:19  
END TIME 9:50:19

HD270.

MUNTSVILLE ALA.

VAD 12/07/76

VAD HREC2

HEIGHT = 30.

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-523	713	63	894	324.1	-634	515	43	819	309.2	8	9	-670	599	-21	899	311.8	67	
2	-515	620	252	806	320.2	-469	428	76	635	312.3	26	18	-627	461	-52	779	306.3	107	
3	-475	642	140	816	322.7	-198	563	-2	623	338.4	35	31	-281	731	-35	818	338.2	98	
4	-493	692	112	850	324.5	-558	563	42	793	315.2	5	6	-556	618	-47	832	318.0	43	
5	-511	676	176	844	322.8	-492	509	87	709	316.0	23	17	-545	685	-57	876	321.5	70	

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-523	713	63	894	324.1	-634	515	43	819	309.2	8	9	-670	599	-21	899	311.8	67	
2	-520	682	126	864	322.8	-579	486	54	757	310.2	14	12	-656	553	-31	859	309.9	81	
3	-502	666	132	845	322.8	-426	517	31	704	321.5	23	20	-506	624	-33	843	321.3	88	
4	-500	670	128	846	323.0	-448	524	33	719	320.5	20	17	-514	623	-35	841	320.7	80	
5	-503	672	140	847	323.0	-459	521	46	716	319.3	21	17	-522	639	-41	850	320.9	78	

C 11

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	TH	
1	177	51	19	64	11.2	82	7	8	59	4.0	47	27	5	53	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	141	203	22	77	16.6	196	190	4	109	23.5	289	161	28	44	23.3	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	17	50	64	30	3.0	65	55	15	84	0.7	11	10	13	15	0	0	0	0	

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
PEAKS					I					I					SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	TH	
1	177	51	19	64	11.2	82	7	8	59	4.0	47	27	5	53	0	0	0	0	
2	126	65	110	68	8.2	112	50	20	114	3.4	41	82	18	79	3.2	0	0	0	
3	116	113	79	67	10.1	244	110	34	122	19.6	252	139	19	64	19.5	0	0	0	
4	104	102	71	60	9.1	224	100	31	115	17.7	227	125	18	57	17.5	0	0	0	
5	86	88	64	52	7.8	192	87	37	103	15.1	192	109	19	51	14.8	0	0	0	

HEIGHT = 45.

VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. HD270.

START TIME 9:45:19  
END TIME 9:50:19

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			SP					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED	TH		
1	-440	837	80	947	332.2	-465	660	20	808	324.7	22	18	-536	811	-59	973	326.5	44
2	-458	822	97	942	330.8	-478	660	86	816	324.1	7	8	-458	806	-73	927	330.3	46
3	-563	686	132	905	320.3	22	260	3	659	6.9	41	39	8	392	-41	867	12.0	136
4	-581	415	138	715	305.5	-87	689	84	695	352.7	16	31	-64	730	-80	732	354.9	124
5	-514	715	183	889	323.8	-515	641	77	823	321.4	2	4	-516	700	-73	871	323.6	55

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH	SP				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V			W	SPEED		
1	-440	837	80	947	332.2	-465	660	20	808	324.7	22	18	-536	811	-59	973	326.5	44
2	-446	632	85	945	331.7	-469	660	42	810	324.5	17	15	-510	809	-64	958	327.8	45
3	-493	773	104	929	327.1	-272	500	27	750	341.5	27	24	-302	642	-55	921	345.5	81
4	-508	714	110	893	323.5	-242	531	36	741	343.3	25	26	-263	657	-59	890	347.0	88
5	-509	714	128	892	323.6	-310	559	46	761	337.8	19	20	-326	668	-62	885	341.2	80

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I. FOURIER COEFFICIENTS						SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	45	35	67	10	3.4	76	124	36	147	.7	61	2	6	35	3.0
2	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0
3	167	182	42	33	15.6	850	109	38	15	94.4	1063	277	16	115	90.0
4	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0
5	89	159	69	76	10.7	98	60	5	108	2.7	71	39	3	74	2.3

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	45	35	67	10	3.4	76	126	36	147	.7	61	2	6	35	3.0
2	33	26	48	8	2.5	54	89	45	104	.6	63	3	9	37	3.0
3	108	123	47	28	10.2	505	235	43	111	52.6	605	267	16	80	51.1
4	103	183	45	91	12.7	458	224	45	102	47.3	550	242	18	105	45.9
5	94	166	57	82	11.5	409	197	42	103	41.2	480	206	17	94	40.3

START TIME 9:45:19  
END TIME 9:50:19

VAD 12/07/76 HUNTSVILLE ALA. H0270.

VAD HREC2

HEIGHT = 60.

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
I					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-665	686	78	967	316.1	-500	656	27	835	321.7	19	18	-598	776	-59	987	322.6	44	
2	-545	790	101	960	325.3	-523	759	76	922	325.4	6	6	-480	834	-51	962	330.0	33	
3	-740	495	84	894	303.9	-550	361	-33	664	303.5	32	32	-746	539	-37	922	305.9	59	
4	-287	818	120	867	340.6	-326	590	82	675	331.0	19	27	-457	754	-30	882	328.7	62	
5	-368	666	215	826	328.9	-332	674	115	752	333.6	24	30	-400	785	-81	882	333.2	111	

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
I					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP	
1	-665	686	78	967	316.1	-500	656	27	835	321.7	19	18	-598	776	-59	987	322.6	44	
2	-625	721	86	965	319.2	-507	690	43	864	323.0	15	14	-559	795	-56	979	325.1	40	
3	-671	630	85	936	313.1	-525	559	12	784	315.2	22	21	-633	693	-48	956	317.4	48	
4	-607	661	91	925	317.7	-491	564	24	766	317.8	21	22	-604	703	-45	944	319.3	50	
5	-547	663	122	900	320.5	-452	592	47	763	321.8	22	24	-553	724	-54	929	322.8	65	

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
I					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	171	113	54	38	12.0	67	204	57	120	12.3	163	57	4	54	9.5				
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
3	105	47	54	61	6.2	89	85	28	28	10.3	51	36	25	20	3.7				
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5	342	314	15	101	32.4	5	47	18	40	1.9	98	36	56	76	4.6				

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
I					I					I					I				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH		
1	171	113	54	38	12.0	67	204	57	120	12.3	163	57	4	54	9.5				
2	140	100	40	27	10.0	49	156	49	99	9.0	134	52	5	41	8.0				
3	128	145	39	53	11.4	61	216	56	130	13.5	142	146	17	44	12.1				
4	194	150	38	55	15.2	98	193	58	125	13.7	146	133	17	49	11.7				
5	237	174	66	76	18.5	111	172	65	107	13.7	160	119	31	58	12.0				

START TIME 9:45:19  
END TIME 9:50:19

VAD 12/07/76 HUNTSVILLE ALA. HD270.

VAD HREC2

HEIGHT = 90.

ONE MINUTE MEANS

PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT				SP	
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-680	619	100	921	312.3	-435	463	-67	637	316.7	34	22	-523	833	-54	984	327.8	55
2	-566	725	93	944	321.5	-464	564	35	736	319.9	28	26	-556	776	-37	967	324.1	59
3	-492	783	134	925	327.8	-357	604	-31	702	324.4	28	29	-534	760	-36	929	324.8	48
4	-561	734	49	929	322.8	-386	520	0	653	322.7	27	23	-452	792	-20	915	330.1	57
5	-353	876	133	944	338.0	-374	510	-49	633	323.7	25	26	-457	732	-28	863	328.0	55

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS										I				SINE WAVE FIT				SP
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH					
1	-680	619	100	921	312.3	-435	463	-67	637	316.7	34	22	-523	833	-54	984	327.8	55				
2	-604	670	95	936	318.4	-454	531	1	703	318.8	30	25	-545	795	-42	972	325.3	58				
3	-576	713	105	934	320.8	-430	549	-6	703	321.5	29	26	-542	786	-41	962	325.2	55				
4	-571	720	86	932	321.4	-415	539	-4	686	321.9	29	25	-512	788	-34	946	326.9	56				
5	-540	742	93	934	323.8	-410	535	-10	679	322.1	28	25	-504	780	-33	934	327.0	56				

C 4

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS								SINE WAVE FIT				TH
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	202	223	45	50	18.2	34	150	70	93	9.6	149	155	9	38	12.6	12.6
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	141	49	24	46	8.8	36	134	110	85	9.7	74	84	11	36	6.6	6.6
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS				I, FOURTH COEFFICIENTS								I SINE WAVE FIT				TH
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	157	169	32	38	13.9	29	121	78	88	7.0	107	114	12	29	9.2	
3	140	146	32	31	12.3	54	105	66	71	7.8	88	95	10	32	7.5	
4	126	116	40	32	10.4	50	102	71	72	7.4	89	83	14	38	7.0	
5	141	121	40	30	11.3	49	94	67	69	6.8	84	78	13	47	6.4	

HEIGHT = 180.

VAD WREC2

VAD 12/07/76

HUNTSVILLE ALA.

HD270.

START TIME 9:45:19  
END TIME 9:50:19

ONE MINUTE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS					I					SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH				
1	-683	737	110	1005	317.1	-604	763	63	974	321.6	7	3	-575	817	-51	1000	324.8	37			
2	-572	762	103	997	322.9	-495	548	48	780	317.3	29	26	-632	750	-49	1013	319.5	36			
3	-529	778	92	941	325.7	-454	791	46	913	330.1	8	4	-438	843	-34	950	332.5	52			
4	-437	803	131	917	331.3	-412	584	19	724	325.2	22	22	-458	773	-42	902	329.2	50			
5	-472	840	79	964	330.6	-539	705	63	888	322.6	5	11	-521	759	-47	922	325.5	53			

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS				SINE WAVE FIT				SP							
	U	V	W	SPEED	TH	I	U	V	W	SPEED	TH								
1	-683	737	110	1005	317.1		-604	763	63	974	321.6	7	3	-575	817	-51	1000	324.8	37
2	-609	753	106	1000	321.0		-532	620	53	845	318.7	22	18	-613	772	-50	1008	321.3	37
3	-589	759	102	965	322.2		-512	663	51	862	321.6	18	15	-569	790	-46	994	324.1	41
4	-538	774	112	962	325.2		-479	636	41	816	322.8	19	17	-532	784	-45	963	325.8	44
5	-529	783	107	963	326.0		-487	646	44	826	322.8	17	16	-531	781	-45	957	325.8	45

C 5

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I <sub>1</sub>				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	327	255	33	6	24.2	239	257	77	29	26.2	253	251	29	28	20.3						
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	55	56	22	23	4.7	163	46	74	56	12.8	72	68	3	21	6.2						
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS						SINE WAVE FIT			TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	240	181	24	6	17.4	180	220	55	114	18.7	182	182	20	21	14.7
3	200	148	20	30	14.4	152	199	45	99	16.3	172	153	18	34	13.2
4	175	120	24	43	12.3	146	161	51	108	14.0	149	122	14	55	10.9
5	162	112	25	40	11.4	137	149	47	102	12.7	136	112	13	53	10.0

HEIGHT = 270.

VAD HRECZ

VAD 12/07/76

MUNTSVILLE ALA.

HD270.

START TIME 9:45:19  
END TIME 9:50:19

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS				SINE WAVE FIT				SP						
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U		V	W	SPEED	TH		
1	-635	680	47	931	316.9	-442	601	91	747	323.6	25	28	-545	811	-28	978	326.0	52
2	-530	622	85	981	327.1	-488	733	59	910	326.9	15	12	-555	801	-29	994	324.8	40
3	-495	623	107	961	328.9	559	185	7	589	71.6	69	48	877	156	-67	891	79.9	201
4	-533	831	122	987	327.3	-395	870	33	956	335.5	9	4	-459	899	-50	1010	332.9	44
5	-415	904	96	995	335.3	-382	698	94	796	331.3	31	26	-517	901	-20	1040	330.1	44

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W		SPEED	TH
1	-635	680	47	931	316.9	-442	601	91	747	323.6	25	28	-545	811	-28	978	326.0	52
2	-565	775	72	964	323.7	-473	689	69	855	325.8	18	17	-552	804	-29	988	325.2	44
3	-547	787	81	963	325.0	-215	563	54	789	352.3	31	25	-194	642	-38	964	353.9	83
4	-545	795	89	968	325.4	-251	624	50	822	348.9	26	21	-247	693	-41	973	349.7	76
5	-523	814	90	973	327.1	-272	637	57	818	346.0	27	21	-292	728	-37	984	346.4	70

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS				SINE WAVE FIT				TH			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U		V	W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	70	73	38	23	5.8	300	131	72	56	20.6	195	196	33	49	15.8
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

PEAKS					I, FOURIER COEFFICIENTS					I SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0
2	78	47	35	33	7.1	214	120	54	102	14.7	138	139	23	36	11.2
3	73	63	33	27	6.4	545	270	54	157	54.2	724	343	27	57	58.1
4	63	74	34	26	5.6	479	271	48	155	47.6	638	319	24	53	51.2
5	78	80	31	26	6.4	431	244	46	139	43.2	581	298	23	55	46.5

HEIGHT = 360.

VAD HREC2

VAD 12/07/76

HUNTSVILLE ALA.

MO270.

START TIME 9145:19  
END TIME 9150:19

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT				TH	SP
	U	V	W	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED				
1	-506	763	127	916	326.4	-371	651	108	749	330.2	27	26	-500	799	-49	943	327.9	36	
2	-430	888	78	996	334.1	-463	699	40	866	326.6	21	18	-533	816	-28	988	326.6	64	
3	-600	666	-7	897	317.9	-534	337	-81	633	302.2	31	28	-716	508	19	879	305.3	52	
4	-573	699	16	933	320.0	-483	613	20	801	322.2	21	27	-542	739	12	944	322.8	46	
5	-293	914	115	960	342.2	-264	775	92	819	341.1	19	24	-407	910	-38	997	335.9	46	

CUMULATIVE MEANS

MIN			PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-506	763	127	916	326.4	-371	651	108	749	330.2	27	26	-500	799	-49	943	327.9	36	
2	-455	846	94	969	331.5	-432	683	63	827	327.8	23	21	-522	811	-35	973	327.0	54	
3	-492	801	69	951	328.1	-458	596	27	778	321.4	25	23	-571	735	-21	949	321.6	55	
4	-519	767	51	945	325.4	-466	602	25	786	321.7	24	24	-561	736	-10	947	322.0	65	
5	-486	788	60	947	327.8	-437	627	34	791	324.4	23	24	-539	761	-14	955	324.0	62	

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	TH	SPEED	U	V	W	TH	SPEED	U	V	W	TH	SPEED		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2	173	83	5	11.1	260	153	96	16	20.2	163	148	35	34	12.7	0		
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4	216	253	90	20.4	222	127	104	36	18.3	201	258	50	86	19.4	0		
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2	130	43	29	46	9.0	191	112	74	68	14.4	117	105	28	35	9.0		
3	128	118	56	52	10.0	164	195	76	112	17.4	136	174	36	55	13.1		
4	145	155	65	49	12.7	162	162	84	89	15.8	139	177	40	58	13.4		
5	157	152	64	45	13.2	166	162	84	82	16.2	140	175	38	56	13.3		

START TIME 9:45:19  
END TIME 9:50:19

MIN	U	V	X	SPEED	TH	U	V	X	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	416	742	63	902	332.4	-218	753	43	806	339.5	20	16	-389	833	-34	924	335.0	47
2	514	649	43	1010	329.4	-547	779	1	976	323.0	14	9	-531	897	-36	1043	329.3	31
3	410	641	74	955	334.4	-429	723	79	842	329.3	13	12	-432	855	-42	960	330.0	44
4	740	713	101	982	336.4	-366	876	37	958	336.1	3	3	-378	897	-37	974	337.1	39
5	555	676	63	949	331.1	-260	669	91	780	331.3	24	22	-458	836	-33	961	331.3	52

MIN	U	V	X	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-16	792	63	902	332.4	-274	753	43	806	334.5	20	14	-389	833	34	924	335.0	47
2	-50	810	63	934	331.4	-381	762	29	863	334.0	18	14	-436	854	-35	963	336.1	42
3	-10	845	67	945	332.7	-400	746	49	855	332.1	16	13	-435	854	-36	962	333.1	43
4	-18	844	73	951	333.7	-398	764	47	872	332.8	14	11	-425	862	-38	964	333.6	42
5	-20	843	77	951	333.0	-384	743	56	849	332.4	16	14	-433	855	-35	963	333.1	45

IN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	154	32	20	43	9.7	45	74	78	39	7.5	127	18	15	38	7.6
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	96	102	25	52	7.9	75	16	63	52	3.8	55	87	30	53	5.3
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	124	82	44	13	8.9	202	140	11	26	18.1	161	62	22	23	10.2

IN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	154	32	20	43	9.7	85	74	78	39	7.5	127	18	15	38	7.6
2	124	50	14	70	7.0	148	54	60	102	10.9	121	39	11	74	6.3
3	103	67	17	56	6.6	141	45	60	77	6.3	50	52	17	59	5.2
4	94	68	21	53	6.1	136	60	54	81	7.6	64	49	16	53	4.9
5	95	66	25	45	6.4	132	60	50	81	9.4	45	49	16	45	5.8

HEIGHT = 30.

VAD HREC2

VAD 12/07/76

HUNTSVILLE ALA.

H0270.

START TIME 9:50:21  
END TIME 9:55:21

ONE MINUTE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										I SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	
1	-436	439	-38	774	304.6	-437	544	10	700	321.2	4	10	-465	622	-1	777	323.2	82
2	-419	689	179	809	328.6	-394	614	52	731	327.1	14	18	-463	637	-59	788	323.9	69
3	-566	748	177	938	322.9	-599	514	92	792	310.7	21	16	-632	686	-64	933	317.3	60
4	-742	693	66	735	341.0	-269	461	24	539	329.8	29	24	-333	623	-43	720	333.7	73
5	-270	630	6	685	336.7	-377	337	8	506	311.8	13	11	-463	423	-21	628	312.4	96

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS										I SINE WAVE FIT				SP
	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH				
1	-636	439	-38	774	304.6	-437	546	10	700	321.2	4	-465	622	-1	777	323.2	82	
2	-492	606	106	797	320.6	-408	591	38	721	325.1	11	-463	632	-40	784	323.7	74	
3	-510	641	124	832	321.2	-456	572	52	738	321.5	13	-505	645	-46	821	322.1	70	
4	-421	659	104	800	327.8	-394	535	43	672	324.3	18	-448	638	-45	787	326.0	71	
5	-399	654	90	784	329.1	-391	507	38	648	322.5	17	-450	607	-41	765	324.0	75	

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS										I SINE WAVE FIT				TH
	U	V	W	TH	U	V	W	TH	U	V	W	TH	U	V	W	SPEED		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	54	41	19	7	4.8	20	64	20	46	4.2	10	22	28	12	1.5	1.5	1.5	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	92	144	33	166	3.2	97	33	27	20	10.7	245	64	16	170	15.3	15.3	15.3	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			FOURIER COEFFICIENTS										I SINE WAVE FIT				TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH			
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2	131	147	127	21	14.3	29	62	28	37	4.5	7	18	39	11	1.2	1.2		
3	113	140	109	72	11.7	98	63	35	47	8.1	84	31	34	75	3.3	3.3		
4	169	129	91	106	13.8	130	77	33	110	9.0	156	39	27	109	9.5	9.5		
5	164	118	91	106	13.0	119	103	33	118	9.5	142	89	27	116	10.0	10.0		

HEIGHT = 45.  
 VAD HREC2  
 VAD 12/07/76 HUNTSVILLE ALA. MU270.  
 START TIME 9:50:21  
 END TIME 9:55:21

ONE MINUTE MEANS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT							
	PEAKS		I		TH		U		V		W		SPEED		TH		SP	
1	-830	428	22	935	297.2	-562	352	-46	664	302.0	54	28	-687	779	-76	1040	318.5	80
2	-510	724	135	912	324.1	-501	729	47	885	325.4	7	4	-487	790	-74	933	328.1	54
3	-471	620	157	947	330.1	-546	491	88	311.9	28	15	15	-593	692	-46	913	319.4	72
4	-589	660	132	987	318.6	-355	574	5	679	327.8	17	15	-480	637	-33	800	322.6	77
5	-83	776	170	780	353.8	-337	579	107	670	329.7	26	28	-482	712	-54	860	325.8	76

CUMULATIVE MEANS

PEAKS	FOURIER COEFFICIENTS										SINE WAVE FIT						
	I		V		W		TH		U		V		W		TH		SP
1	830	428	22	297.2	-562	352	-46	664	302.0	54	28	-687	779	-76	1040	318.5	80
2	617	625	97	315.1	-521	603	42	812	317.6	23	12	-554	786	-75	968	324.9	63
3	580	674	112	318.9	-527	575	53	793	316.2	24	13	-564	763	-68	954	323.5	65
4	563	669	119	316.8	-470	575	37	755	320.1	22	14	-536	721	-56	903	323.2	69
5	512	685	126	323.8	-451	575	47	743	321.4	22	16	-528	720	-56	897	323.6	70

ONE MINUTE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	212	231	39	19.5	41	43	40	12	82	111	17	51	7.9	7.9
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	158	61	9	5.1	46	114	61	72	8.4	10	21	105	4.8	4.8
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	FOURIER COEFFICIENTS										SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	SP
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	238	236	71	20.7	16	219	82	128	13.8	130	79	12	71	7.9
3	206	216	65	19.5	39	184	71	111	11.6	108	80	17	65	7.0
4	176	170	51	17.4	47	154	66	109	11.4	94	105	24	105	5.9
5	248	160	51	18.7	101	141	64	105	11.1	88	96	22	98	5.4

HEIGHT = 60. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. HU270. START TIME 9:50:21 END TIME 9:55:21

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-693	470	56	838	304.1	-509	344	-42	617	304.3	33	27	-645	537	-25	840	309.7	41
2	-555	691	159	890	321.0	-429	594	110	735	324.1	26	22	-491	789	-54	931	328.0	64
3	-193	884	161	905	347.6	-289	705	77	762	337.6	25	20	-424	835	-23	937	333.0	56
4	-308	770	99	830	338.1	-354	603	64	700	329.5	25	26	-330	803	-15	868	337.6	53
5	-680	690	69	907	319.5	-444	440	-57	626	314.6	27	26	-596	670	-33	898	318.3	62

CUMULATIVE MEANS

PEAKS			I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP	
1	-693	470	56	838	304.1	-509	348	-42	617	304.3	33	27	-645	537	-25	840	309.7	41	
2	-801	617	125	873	315.4	-456	512	59	696	317.5	29	23	-542	705	-44	900	321.9	56	
3	-459	684	134	881	323.4	-414	560	64	712	322.5	28	23	-513	737	-39	910	324.7	56	
4	-461	701	127	871	326.4	-402	569	64	710	323.9	27	23	-476	751	-34	901	327.3	56	
5	-482	699	121	877	325.2	-409	547	44	696	322.4	27	24	-496	737	-34	901	325.8	57	

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				TH	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	63	95	12	34	7.0	37	42	17	12	4.3	23	66	29	44
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	91	144	60	39	11.0	53	146	90	69	11.8	90	153	26	61
3	217	178	52	36	16.4	94	153	74	65	13.9	94	141	24	53
4	206	159	48	34	17.3	86	134	64	57	12.5	116	125	23	49
5	192	142	46	37	15.7	70	131	76	61	11.8	114	117	21	44

START TIME 9:50:21  
END TIME 9:55:21

SINE WAVE FIT

PEAKS			FOURIER COEFFICIENTS						SINE WAVE FIT									
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-467	420	132	967	329.4	-429	714	73	838	329.2	15	15	-499	827	-35	968	328.6	48
2	-452	254	86	879	329.0	-404	563	13	694	324.2	36	29	-554	759	-81	940	323.8	62
3	-376	856	121	936	336.2	-380	638	-4	744	329.0	21	22	-503	802	-21	947	327.9	59
4	-300	790	52	846	339.2	446	744	47	867	317.0	10	24	495	732	70	884	34.1	147
5	-471	720	54	862	326.5	-464	513	31	703	317.9	17	21	-512	643	-1	836	320.7	80

SINE WAVE FIT

PEAKS			FOURIER COEFFICIENTS						I				SINE WAVE FIT					
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-4.7	820	132	967	329.8	-429	714	73	838	329.2	15	15	-499	827	-35	968	328.6	48
2	-4.2	798	117	938	329.5	-421	663	53	790	327.6	22	19	-517	804	-50	959	327.0	53
3	-4.8	821	119	937	332.2	-404	653	30	771	328.1	22	20	-511	808	-38	954	327.3	55
4	-4.6	816	107	922	333.4	-463	668	36	787	333.6	20	21	-343	791	-44	943	338.5	71
5	-4.2	792	94	907	331.6	-314	629	35	766	333.4	19	21	-385	754	-33	916	334.0	73

SINE WAVE FIT

PEAKS			I. FOURIER COEFFICIENTS						I. SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	
1	232	200	40	54	136	0	34	62	40	125	11	86	5.9
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	40	29	16	43	1.5	1	85	114	72	3.5	25	13	6
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	130	37	114	4.3	142	68	60	46	12.3	109	21	88	14.6

SINE WAVE FIT

[illegible]

HEIGHT = 180. VAD HRECZ VAD 12/07/76 HUNTSVILLE ALA. HU270. START TIME 9:50:21 END TIME 9:55:21

ONE MINUTE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U
1	-547	844	175	1007	327.1	-429	630	52	775	325.9	28	23	-553	820	-72	994	326.3	55	55
2	-613	562	49	832	312.4	-576	304	-35	652	297.8	34	31	-724	493	-33	877	304.2	41	41
3	-221	852	54	900	345.8	-384	629	-28	745	327.3	22	10	-412	814	-25	917	333.4	46	46
4	-615	594	85	856	313.9	-565	685	33	848	320.4	6	4	-566	719	-29	916	321.8	47	47
5	-657	675	130	876	320.4	-358	472	-35	609	321.3	32	26	-482	682	-35	842	324.1	62	62

CUMULATIVE MEANS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U
1	-547	844	175	1007	327.1	-429	630	52	775	325.9	28	23	-553	820	-72	994	326.3	55	55
2	-564	750	133	944	322.2	-478	522	23	734	316.5	30	26	-610	711	-59	955	318.9	51	51
3	-430	791	101	929	331.6	-440	564	2	739	320.9	27	20	-531	752	-46	940	324.7	49	49
4	-461	758	94	917	328.7	-461	585	7	764	320.8	24	17	-537	747	-43	936	324.2	48	48
5	-445	737	106	907	326.6	-435	554	-3	725	320.9	26	19	-523	731	-41	912	324.2	52	52

ONE MINUTE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U
1	85	56	7	94	2.4	174	91	69	22	14.5	158	3	31	90	7.5	7.5	7.5	7.5	7.5
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	262	21	40	45	16.6	52	204	69	145	11.9	135	3	12	58	7.6	7.6	7.6	7.6	7.6
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	19	1	35	11	1.0	100	191	20	89	18.7	67	158	17	90	10.0	10.0	10.0	10.0	10.0

CUMULATIVE STANDARD DEVIATIONS

FOURIER COEFFICIENTS										SINE WAVE FIT									
MIN	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U	V	W	TH	SP	I	U
1	46	56	7	94	2.4	174	91	69	22	14.5	158	3	31	90	7.5	7.5	7.5	7.5	7.5
2	72	168	73	121	8.6	149	194	70	73	19.2	149	149	32	93	13.8	13.8	13.8	13.8	13.8
3	237	132	71	92	16.5	120	144	67	49	16.0	166	145	30	75	13.1	13.1	13.1	13.1	13.1
4	225	142	63	84	16.5	119	171	61	101	14.3	149	130	24	68	11.8	11.8	11.8	11.8	11.8
5	195	126	57	77	14.4	117	170	56	116	14.0	131	129	24	79	10.7	10.7	10.7	10.7	10.7

START TIME 9:50:21  
END TIME 9:55:21

VAD 12/07/76 MONTSVILE ALA. HD270.

VAD WPEC2

HEIGHT = 470.

# ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	-586	786	11	784	323.1	-543	425	-70	693	308.3	36	23
2	-405	742	27	745	311.3	-373	487	-49	614	322.5	34	32
3	-316	854	35	934	340.0	-306	708	28	773	336.2	23	20
4	-439	939	35	1037	339.9	-511	676	101	848	322.9	19	15
5	-570	779	14	966	323.7	-521	709	33	881	323.6	9	7

# CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	-586	786	11	784	323.1	-543	425	-70	693	308.3	36	23
2	-527	771	17	938	325.8	-446	446	-63	667	313.0	36	26
3	-443	804	24	938	331.5	-414	551	-76	709	322.3	30	23
4	-442	827	26	955	332.1	-430	572	-5	732	322.4	28	22
5	-474	815	23	958	330.0	-453	606	4	769	322.7	24	18

# ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	65	60	132	8	5.1	90	32	51	6.7	132	160	32
2	0	0	0	0	0	0	0	0	0	0	0	0
3	315	80	9	34	19.9	2	142	80	130	4.1	44	23
4	0	0	0	0	0	0	0	0	0	0	0	0
5	6	25	33	17	1.2	1	44	30	35	1.7	21	28

# CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	W	TH	U	V	W	TH	U	V	W	TH
1	65	60	132	8	5.1	90	32	51	6.7	132	160	32
2	115	94	94	80	5.9	117	42	58	9.5	133	117	24
3	214	70	67	59	13.3	129	163	65	97	14.5	116	19
4	189	83	60	67	12.0	124	164	78	103	13.0	116	20
5	171	74	53	57	10.8	111	146	69	112	11.0	99	20

START TIME 9:50:21  
END TIME 9:55:21

HU270.

MUNTSVILLE ALA.

VAO 12/07/76

VAD HREC2

HEIGHT = 360.

ONE MINUTE MEANS

MIN	PEAKS			I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH				
1	-500	834	42	783	328.9	-428	723	-7	845	330.2	20	12	-485	832	-16	964	329.7	40			
2	-499	761	46	709	326.8	-247	693	-26	736	340.4	16	20	-383	781	-24	870	333.8	52			
3	-281	891	60	736	342.4	-407	631	26	754	327.6	27	19	-446	804	-45	920	330.9	49			
4	-282	867	111	912	341.9	-915	635	124	759	326.4	25	17	-416	819	-70	919	333.0	44			
5	-522	782	61	947	326.4	-332	640	77	724	332.7	27	25	-448	828	-11	942	331.6	56			

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				SP					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	I	3D		2D	U	V	W	SPEED
1	-500	838	42	783	328.9	-428	723	-7	845	330.2	20	12	-485	832	-16	964	329.7	40
2	-499	812	57	754	328.2	-368	713	-13	809	333.6	19	15	-451	815	-18	933	331.1	44
3	-412	844	58	749	333.9	-383	680	2	787	331.2	22	17	-449	811	-29	928	331.0	46
4	-340	848	67	743	335.2	-389	673	22	782	330.4	22	17	-444	812	-36	926	331.4	46
5	-423	831	66	744	333.0	-375	664	36	768	331.0	23	19	-445	816	-30	930	331.4	48

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	120	120	9	41	9.6	191	91	50	175	8.2	45	33	6	52	1.3
2	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
3	34	44	6	32	2.8	136	60	66	124	6.3	1	17	15	16	.5
4	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
5	156	52	113	43	9.6	101	6	39	41	7.3	71	27	40	57	3.0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				I. FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	120	120	9	41	9.6	191	91	50	175	8.2	45	33	6	52	1.3
2	45	76	26	52	6.9	171	67	37	139	8.3	67	34	6	65	2.5
3	134	83	14	42	9.3	140	72	47	120	7.4	44	29	17	47	1.8
4	131	75	27	40	8.9	126	67	65	108	6.8	45	26	22	42	1.8
5	140	73	49	38	9.3	116	54	62	96	6.5	46	25	27	43	1.9

HEIGHT = 540. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. HQ270. START TIME 9:50:21 END TIME 9:55:21

ONE MINUTE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS				I			SINE WAVE FIT			TH	SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		
1	-282	925	92	967	343.0	-198	834	-13	858	346.6	19	16	-307	890	-21	942	340.9	68
2	-324	880	61	944	339.4	-436	726	63	848	329.1	16	12	-432	863	-23	968	333.0	47
3	-391	859	409	944	335.5	-440	603	90	747	323.8	27	20	-458	798	-36	921	330.1	65
4	-486	755	65	102	327.1	-359	647	28	741	330.9	27	27	-458	817	-29	943	330.5	52
5	-690	735	137	1009	316.8	-358	774	96	857	335.2	20	13	-512	846	-50	990	328.8	46

CUMULATIVE MEANS

MIN			PEAKS			I			FOURIER COEFFICIENTS			I			SINE WAVE FIT			TH		SP
U	V	W	SPEED	TH	I	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP		
-282	925	92	967	343.0	-198	834	-13	858	346.6	19	16	-307	890	-21	942	340.9	68			
-310	895	71	952	340.6	-356	762	37	851	334.9	17	13	-390	872	-22	960	335.6	54			
-330	886	106	950	339.3	-377	722	50	825	332.1	19	15	-407	854	-26	950	334.3	57			
-382	843	92	934	335.2	-371	697	43	797	331.7	22	19	-424	841	-27	948	333.0	55			
-426	827	99	945	332.6	-369	709	50	806	332.2	22	18	-437	842	-30	954	332.4	54			

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS										I SINE WAVE FIT			TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED			
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2	104	125	43	81	8.6	73	4	47	34	4.4	50	140	2	103	6.4		
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4	86	77	48	14	7.2	9	9	101	3	9	112	105	15	37	9.1		
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS			I, FOURIER COEFFICIENTS					I			SINE WAVE FIT			TH
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	77	92	35	59	6.4	146	63	55	25	10.6	80	100	2	74	6.4
3	75	78	75	48	5.8	127	95	52	56	10.3	74	90	7	63	5.9
4	107	97	65	45	8.4	99	83	62	62	8.0	80	86	9	52	6.4
5	152	97	62	50	10.4	90	82	60	61	7.4	80	79	12	50	6.1

HEIGHT = 30. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. H0270. START TIME 9:55:21  
END TIME 10:02:1

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-588	482	32	763	309.6	69	287	-3	566	18.2	20	26	113	8	685
2	-485	544	-67	730	318.3	-135	417	-52	439	342.0	18	27	-220	665	18
3	-518	532	115	743	315.6	-588	375	61	698	302.5	15	13	-653	386	701
4	-664	394	112	775	301.0	-592	383	29	704	302.6	13	9	-609	438	-57
5	-360	770	133	872	335.7	-440	584	49	716	322.0	24	16	-460	701	751
													-33	839	326.7

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-588	482	32	763	309.6	69	287	-3	566	18.2	20	26	113	8	685
2	-554	503	-7	752	312.5	1	330	-19	524	6.1	19	27	2	451	12
3	-540	514	41	748	313.7	-234	343	12	594	340.7	18	21	-260	425	690
4	-560	495	53	753	311.6	-294	353	15	612	334.3	17	19	-318	427	718
5	-510	584	73	783	317.6	-330	406	23	638	331.3	19	18	-354	496	724
													-22	753	332.0

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	W	TH	SP
1	112	9	173	81	5.9	644	234	30	40	83.1	787	240	27	9	82.1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	84	102	69	132	9	74	42	5	84	4	54	60	1	77	1.8
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	279	43	48	77	18.0	3	10	69	10	4.3	44	53	7	69	4.5

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	W	TH	SP
1	112	9	173	81	5.9	644	234	30	40	83.1	787	240	27	9	82.1
2	94	37	141	60	6.5	470	182	35	79	62.4	589	251	20	11	61.6
3	84	60	125	79	4.9	465	132	51	113	56.2	551	184	40	55	56.3
4	91	71	115	71	6.8	441	117	46	115	52.6	513	164	37	51	52.2
5	160	142	106	87	14.3	379	140	50	109	44.8	439	149	32	73	44.2

HEIGHT \* 45. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. HD270. START TIME 9:55:21 END TIME 10: 0:21

ONE MINUTE MEANS

MIN	PEAKS				I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH				
1	-456	614	-38	786	323.0	-431	391	-58	582	312.2	35	31	-568	633	-13	852	318.0	71			
2	-240	860	70	693	344.4	-578	416	0	713	305.7	8	17	-630	489	-8	799	307.8	121			
3	-444	689	204	620	327.1	-473	549	87	727	319.1	13	6	-481	640	-91	804	322.9	58			
4	-238	794	134	929	343.3	-393	465	76	609	319.7	32	36	-585	607	-24	843	316.0	85			
5	-360	760	157	647	335.2	-301	658	-109	759	337.2	15	5	-327	757	-87	847	337.5	69			

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				SP					
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED	TH		
1	-456	614	-38	786	323.0	-431	391	-58	582	312.2	35	31	-568	633	-13	852	318.0	71
2	-384	676	-1	822	330.1	-440	399	-38	626	310.0	26	26	-589	580	-11	834	314.6	88
3	-408	693	80	821	328.9	-477	459	11	666	313.6	21	18	-546	607	-43	822	317.9	76
4	-380	710	89	823	331.3	-463	460	22	657	314.6	23	21	-552	607	-40	826	317.6	77
5	-375	722	106	829	332.3	-423	509	44	682	320.3	21	17	-496	645	-52	831	322.6	75

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	187	179	11	30	18.9	33	30	8	45	0	21	47	9	21	3.2
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	6	2	1	3	0.5	38	64	5	23	5.6	64	65	24	13	6.4
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	167	39	77	106	9.2	337	27	12	111	24.6	282	24	2	88	18.4

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	187	179	11	30	18.9	33	30	8	45	0	21	47	9	21	3.2
2	182	190	63	65	18.2	48	24	34	42	3.8	39	90	7	34	6.3
3	133	135	127	46	13.0	65	90	73	41	6.3	73	77	45	30	7.2
4	130	127	111	42	13.0	68	80	71	76	6.1	67	69	41	28	6.5
5	133	111	103	54	11.7	159	115	72	90	14.9	159	91	41	42	12.8

HEIGHT = 60. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. MU270. START TIME 9:55:21 END TIME 10: 0:21

ONE MINUTE MEANS

PEAKS										FOURIER COEFFICIENTS										I										SINE WAVE FIT										SP	
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP																
1	-683	605	51	884	335.7	-472	506	24	711	318.3	20	21	-474	666	0	846	324.3	90																							
2	-835	424	17	936	296.8	-494	457	47	674	312.7	25	16	-624	644	-20	897	315.8	97																							
3	-415	756	147	865	331.2	147	367	65	655	24.8	38	38	199	527	-49	842	24.4	132																							
4	-208	856	107	881	346.3	-236	719	93	756	341.7	8	14	-300	795	-52	850	339.3	63																							
5	-278	724	112	805	340.5	-294	602	97	678	334.8	18	30	-319	773	-50	837	337.5	60																							

CUMULATIVE MEANS

MIN	PEAKS			I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH			
1	-363	605	51	884	335.7	-472	506	24	711	318.3	20	21	-474	666	0	846	324.3	90		
2	-521	678	39	902	322.7	-480	490	45	699	316.4	22	19	-524	659	-7	863	321.5	92		
3	-478	709	82	895	326.1	-229	441	53	681	343.8	28	27	-234	606	-23	854	346.7	108		
4	-433	733	87	893	329.4	-230	487	60	694	343.4	25	25	-245	637	-28	854	345.4	100		
5	-395	731	93	871	332.2	-246	517	69	690	341.3	23	26	-264	671	-34	850	343.4	90		

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	24	12	61	21	1.1	237	237	77	3	103	18.5	239	189	19	15	20.9
2	245	135	9	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0.0
3	245	135	9	0	18.3	661	330	330	77	37	74.8	788	408	12	68	68.1
4	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0.0
5	323	3	22	110	22.0	120	92	92	10	135	5.9	38	116	12	122	5.6

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	24	12	61	21	1.1	237	237	77	3	103	18.5	239	189	19	15	20.9
2	273	222	47	34	22.5	168	61	61	36	76	13.5	190	135	18	32	15.6
3	236	176	68	25	18.9	491	184	184	47	61	53.8	575	236	27	42	49.7
4	238	169	62	23	18.8	440	199	199	45	63	48.1	515	225	27	38	44.5
5	246	142	54	61	18.6	375	181	181	42	74	40.9	437	205	25	57	37.8

HEIGHT = 90. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. H0270. START TIME 9:55:21 END TIME 10:00:21

ONE MINUTE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-367	826	69	915	336.3	-356	602	-32	701	329.5	24	16	-427	758	60
2	-401	720	52	824	330.8	-384	524	-47	650	323.7	20	25	-459	784	72
3	-505	768	171	933	326.6	-364	758	32	844	334.7	13	14	-404	804	63
4	-390	912	-8	993	336.8	-276	581	-82	643	334.5	22	12	-386	864	65
5	-510	605	74	806	318.3	-376	555	49	690	324.3	32	28	-426	749	56

CUMULATIVE MEANS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	-367	826	69	915	336.3	-356	602	-32	701	329.5	24	16	-427	758	60
2	-378	791	63	885	334.5	-365	576	-37	684	327.6	23	19	-438	767	64
3	-429	742	106	904	331.3	-365	649	-9	748	330.4	19	17	-424	782	63
4	-423	803	87	919	332.2	-350	634	-21	731	331.1	19	16	-418	796	64
5	-444	754	85	891	328.7	-356	617	-3	718	329.4	22	19	-420	784	62

ONE MINUTE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	200	41	53	44	12.5	74	6	13	43	5.0	91	28	29	69	4.4
2	U	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	184	122	52	0	13.6	130	64	32	114	6.1	9	64	14	61	1.3
4	U	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	54	462	79	163	15.4	39	219	77	158	13.5	125	246	9	149	15.4

CUMULATIVE STANDARD DEVIATIONS

PEAKS		FOURIER COEFFICIENTS										SINE WAVE FIT			
MIN	U	V	W	TH	U	V	W	TH	2D	3D	U	V	W	TH	SP
1	200	41	53	44	12.5	74	6	13	43	5.0	91	28	29	69	4.4
2	143	68	39	61	9.4	55	45	13	42	4.4	67	25	29	53	3.1
3	153	79	70	51	10.5	76	110	42	109	6.1	51	42	29	49	2.8
4	138	88	79	58	9.6	77	102	48	106	5.7	49	50	27	50	3.1
5	125	154	73	94	11.9	68	126	60	110	7.7	63	104	24	71	6.5

START TIME 9:55:21  
END TIME 10:01:21

MD270.

HUNTSVILLE ALA.

VAD 12/07/76

VAD HREC2

HEIGHT = 180.

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-534	662	117	851	321.0	-559	620	37	835	317.9	3	3	-556	662	-34	865	319.9	53
2	-502	739	73	908	325.5	-249	653	-42	719	336.4	17	18	-446	729	-3	860	328.9	55
3	-305	921	178	971	341.6	-586	626	-13	859	316.8	22	17	-550	762	-30	940	324.1	79
4	-431	849	79	955	333.1	-224	726	44	772	342.4	24	18	-261	852	-39	893	343.0	78
5	-474	840	209	965	330.5	-237	738	126	776	342.1	24	19	-344	882	-74	947	338.6	54

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-534	662	117	851	321.0	-559	620	37	835	317.9	3	3	-556	662	-34	865	319.9	53
2	-513	713	88	889	324.0	-379	642	-15	758	330.2	13	13	-482	707	-13	862	325.9	54
3	-461	765	110	910	328.4	-431	634	-15	783	326.9	15	14	-499	721	-17	881	325.5	61
4	-451	794	100	925	330.0	-362	667	4	779	332.1	18	15	-420	764	-25	885	331.3	67
5	-454	800	115	930	330.1	-344	674	21	779	333.5	19	16	-409	781	-32	894	332.3	65

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
						U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	171	152	83	29	14.4	126	12	17	62	8.9	149	0	38	77	8.5
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	100	23	104	24	6.0	166	100	113	45	14.1	86	10	48	16	5.5
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
						U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	122	116	63	39	10.5	179	21	47	80	12.4	123	39	32	55	7.9
3	144	141	69	52	12.3	179	19	39	82	12.1	106	42	28	59	6.6
4	121	118	72	48	10.2	191	65	66	67	13.9	153	75	32	47	10.7
5	111	109	78	46	9.3	180	65	76	61	13.2	143	82	35	49	10.1

HEIGHT = 270.

VAD HRECZ VAD 12/07/76 HUNTSVILLE ALA. HD270. START TIME 9:55:21  
END TIME 10: 0:21

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-39.3	74.2	80	875	333.2	-352	620	63	714	330.4	32	29	-506	756	-2	911	326.2	58
2	-45.7	76.3	94	991	328.9	-442	566	76	720	321.9	27	18	-473	752	-28	890	327.7	62
3	-80.4	59.0	215	994	306.2	705	-5	-3	705	90.5	30	34	822	-99	54	828	97.0	178
4	-35.9	838	18	917	336.8	-330	767	67	837	336.7	16	11	-374	835	-30	916	335.9	50
5	-36.8	839	126	917	336.2	-500	676	1	842	323.4	19	15	-458	788	-34	912	329.8	70

CUMULATIVE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED	TH	SP
1	-39.3	74.2	80	675	333.2	-352	620	63	714	330.4	32	29	-506	756	-2	911	326.2	58
2	-43.6	76.9	90	686	330.4	-412	584	72	718	324.7	28	22	-484	754	-20	897	327.2	60
3	-52.8	72.4	121	715	324.3	-132	437	53	715	356.2	29	25	-157	540	-1	880	359.6	90
4	-47.2	76.7	87	914	328.5	-198	547	58	755	349.7	24	20	-230	639	-11	892	351.7	77
5	-45.7	77.3	92	915	329.6	-241	565	50	768	345.9	24	19	-262	660	-14	895	348.6	76

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT			
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	47	62	29	29	4.6	20	64	32	38	4.4	18	77	22	56	3.6	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	121	45	60	7	8.1	66	17	47	11	4.6	59	44	21	64	2.3	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

CUMULATIVE STANDARD DEVIATIONS

PEAKS															
FOURIER COEFFICIENTS															
I. SINE WAVE FIT															
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
2	50	45	22	23	4.1	54	55	24	27	5.8	23	55	21	41	2.7
3	188	97	65	59	12.5	561	299	42	23	63.1	654	429	41	48	64.9
4	178	94	78	46	12.2	447	284	40	66	49.9	519	366	36	51	51.8
5	167	94	73	42	11.5	424	267	42	68	46.6	482	339	34	47	44.0

$$\text{val}(\text{get}) = \text{val}().$$

VAD HREC2

VAD 12/07/76

HUNTSVILLE ALA. MO270.

START TIME 9:55:21  
END TIME 10: 0:21

## ONE MINUTE MEANS

LINE	PEAKS			I				FOURTH COEFFICIENTS				I				SINE WAVE FIT				SP
	U	V	A	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH			
1	-40.2	711	42	662	325.5	-422	424	-73	599	315.1	48	25	-523	787	-58	945	326.4	46		
2	-34.8	755	153	662	332.8	-349	589	42	685	329.2	32	28	-481	764	-40	904	327.7	61		
3	-46.0	722	156	779	317.5	-751	530	5	920	305.2	14	4	-749	558	-10	935	306.7	68		
4	-40.1	793	69	696	333.3	-736	487	26	674	318.1	29	25	-494	734	-47	904	326.2	61		
5	-10.3	677	66	656	348.1	-559	462	-28	726	309.6	31	31	-618	535	14	818	310.8	130		

## CUMULATIVE MEANS

PEAKS			FOURIER COEFFICIENTS					SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP		
1	-49.2	711	42	462	325.5	-422	424	-73	599	315.1	48	25	-523	787	-58	945	326.4	46
2	-49.1	740	129	462	330.4	-373	534	3	656	324.5	37	27	-495	772	-46	918	327.2	56
3	-49.1	736	136	491	327.2	-427	533	4	722	319.7	31	21	-558	718	-37	922	322.1	59
4	-45.4	755	114	493	329.2	-457	518	11	706	319.1	31	23	-537	723	-40	916	323.5	60
5	-41.6	772	107	493	331.9	-471	510	6	709	317.6	31	24	-548	697	-32	902	321.7	70

## ONE MINUTE STANDARD DEVIATIONS

I. FOURIER COEFFICIENTS															I SINE WAVE FIT			
PEAKS																		
	U	V	e	SPEED	TH	U	V	w	SPEED	TH	U	V	w	SPEED	TH			
MIN	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0			
1	U	RS	42	10	13.7	5	65	90	59	2.4	1	70	10	59	2.4			
2	RS	42	10	13.7	5	65	90	59	2.4	1	70	10	59	2.4	2.4			
3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U			
4	RS	83	25	10.3	10.3	171	156	47	2	19.9	229	122	57	26	16.5			
5	U	U	U	U	.0	U	U	U	U	.0	U	U	U	U	.0			

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I, SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	14.3	6.5	7	10.5	4.3	0	10.5	24	45	8.3	24	51	13	48	1.9
3	16.7	54	44	54	10.7	19.2	84	72	142	11.8	128	114	21	20	10.4
4	15.3	56	41	47	10.0	16.8	92	40	113	12.4	146	104	31	34	11.1
5	17.3	49	56	43	11.6	15.8	93	57	103	12.2	137	119	35	49	11.2

HEIGHT = 540.

VAD HREC2

VAD 12/07/76

MUNTSVILLE ALA. H0270.

START TIME 9:55:21  
END TIME 10: 0:21

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I	SINE WAVE FIT				SP				
	U	V	W	SPEED	TH	U	V	W		SPEED	TH	20	30		U	V	W	SPEED
1	-526	715	78	874	323.3	-385	620	-44	747	326.5	21	17	-474	750	-13	893	327.6	54
2	-336	835	140	900	338.0	-452	643	79	799	325.2	18	17	-508	760	-38	922	325.7	55
3	-351	927	177	991	339.2	-622	489	-7	792	308.1	28	26	-643	607	-26	885	313.3	118
4	-618	519	69	852	309.6	-492	387	37	709	308.1	28	22	-578	583	-31	899	314.6	51
5	-85	878	107	882	354.4	-513	507	-20	722	314.6	26	24	-546	603	0	814	317.8	104

CUMULATIVE MEANS

MIN	PEAKS			FOURIER COEFFICIENTS							I			SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	
1	-526	715	78	896	323.3	-385	620	-44	747	326.5	21	17	-474	750	-13	893	327.6	54
2	-431	775	109	898	330.6	-419	631	17	773	325.9	19	17	-491	755	-26	908	326.7	54
3	-415	805	123	917	332.4	-459	603	12	777	322.3	21	19	-522	725	-26	903	324.0	67
4	-473	724	107	898	325.9	-469	541	19	758	318.2	23	20	-538	685	-27	902	321.3	62
5	-424	743	107	896	329.4	-474	537	14	753	317.8	23	20	-539	674	-24	891	320.9	68

ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
						U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	100	143	20	55	10.6	117	232	43	131	17.4	110	152	10	72	10.3
2	1	20	12	19	.5	180	84	39	39	14.6	96	0	0	0	0
3	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0
4	227	308	77	22	26.2	249	370	10	1	39.4	344	388	4	30	34.0
5	0	0	0	0	.0	0	0	0	0	.0	0	0	0	0	.0

CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
						U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	100	143	20	55	10.6	117	232	43	131	17.4	110	152	10	72	10.3
2	124	108	38	34	10.5	134	143	79	45	13.1	86	99	16	45	7.9
3	113	116	45	51	9.9	147	139	70	74	13.9	101	108	14	40	9.1
4	164	210	55	53	17.4	169	215	67	69	20.9	165	194	17	35	16.4
5	205	202	51	44	19.0	157	201	63	65	19.4	153	182	15	45	15.2

START TIME 10: 0:25  
END TIME 10: 5:25

MU270.

HUNTSVILLE ALA.

VAD 12/07/76

VAD HRECZ

HEIGHT = 300.

# ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	20	30	U	V	W	SPEED		TH
1	-270	736	46	796	339.3	-210	637	33	682	342.4	7	2	-199	703	-27	746	344.1	69
2	-550	933	16	700	308.2	-251	553	16	608	335.5	18	16	-248	647	-7	694	338.9	86
3	-326	643	162	767	334.8	-408	537	37	675	322.7	8	2	-430	602	-38	741	324.4	86
4	-568	637	253	860	318.0	-496	321	14	594	303.3	22	24	-616	468	-46	779	306.9	93
5	-688	500	196	878	307.1	-554	493	95	778	313.6	20	15	-589	603	-69	890	315.5	71

# CUMULATIVE MEANS

MIN	U	V	W	SPEED	TH	FOURIER COEFFICIENTS				I	SINE WAVE FIT				SP			
						U	V	W	SPEED		TH	2D	3D	U		V	W	SPEED
1	-270	736	46	796	339.3	-210	637	33	682	342.4	7	2	-199	703	-27	746	344.1	69
2	-363	635	36	764	328.9	-224	609	28	657	340.1	11	7	-215	685	-21	728	342.4	75
3	-354	644	67	765	330.4	-270	591	30	662	335.7	10	6	-269	664	-25	731	337.9	77
4	-425	645	129	797	326.3	-345	501	25	639	324.9	14	12	-385	599	-32	747	327.6	83
5	-446	609	146	817	321.5	-397	492	42	674	322.1	16	13	-436	600	-41	783	324.5	80

# ONE MINUTE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	164	113	111	49	14.0	190	5	13	64	15.2	199	60	22	4	16.1	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	92	128	49	34	10.3	104	13	19	80	6.5	33	117	18	45	8.4	
5	246	297	7	19	25.5	313	159	58	123	24.8	278	286	6	10	26.1	

# CUMULATIVE STANDARD DEVIATIONS

MIN	U	V	W	SPEED	TH	I	FOURIER COEFFICIENTS				I	SINE WAVE FIT				TH
							U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	164	113	111	49	14.0	190	5	13	64	15.2	199	60	22	4	16.1	
2	199	144	80	65	20.5	137	49	14	62	11.4	144	54	19	30	11.8	
3	163	160	91	53	17.0	145	54	12	52	12.8	159	40	18	25	13.2	
4	173	136	121	64	15.3	168	145	15	64	19.7	218	123	19	37	19.3	
5	205	174	107	68	18.5	209	137	41	76	19.8	232	150	24	73	19.9	

START TIME 10: 0:25  
END TIME 10: 5:25

HD270.

MUNTSVILLE ALA.

VAD 12/07/76

VAD MREC2

HEIGHT = 45.

ONE MINUTE MEANS

MIN	PEAKS			I			FOURIER COEFFICIENTS					SINE WAVE FIT					SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-475	597	111	763	321.4	-403	544	6	691	323.6	13	2	-401	641	-33	756	327.9	73
2	-403	690	-1	799	329.7	-367	400	-44	550	316.3	37	14	-437	608	0	756	324.0	87
3	-633	576	118	852	312.0	-540	322	-32	629	300.8	33	25	-672	542	-36	864	308.9	56
4	-641	577	75	896	311.5	-484	423	27	683	309.4	27	27	-638	562	-36	872	311.1	56
5	-526	654	204	843	321.3	-563	621	84	839	317.4	18	18	-506	712	-110	874	324.6	59

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				TH	SP
	U	V	X	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		
1	-475	597	111	763	321.4	-403	544	6	681	323.6	13	2	-401	641	-33	756	327.9	73
2	-427	659	34	787	326.9	-379	449	-27	593	318.8	29	10	-425	619	-10	756	325.3	82
3	-478	636	56	803	323.2	-419	417	-24	602	314.3	30	14	-487	599	-16	783	321.2	76
4	-532	617	62	834	319.3	-441	412	-9	629	312.6	29	18	-537	587	-23	813	317.8	69
						-441	448	4	659	313.4	27	17	-533	605	-35	821	318.8	68

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				I, FOURIER COEFFICIENTS				I SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	27	46	93	51	0	20	145	7	92	12.0	99	97	8	21	10.4
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	202	274	60	31	21.9	150	296	77	77	27.7	158	219	6	26	17.8
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS					I, FOURTH COEFFICIENTS					I SINE WAVE FIT				
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	44	63	93	42	4.7	25	133	30	100	9.5	73	71	20	15	7.7
3	109	90	86	47	8.4	83	126	25	83	11.9	137	70	21	55	10.4
4	150	137	72	62	13.2	99	165	49	84	15.6	150	114	19	64	12.5
5	137	126	85	57	12.1	101	169	56	110	14.4	137	114	37	63	11.7

HEIGHT = 600. VAD HRECZ VAD 12/07/76 HUNTSVILLE ALA. HD270. START TIME 10: 0:25 END TIME 10: 5:25

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				SP	
	U	V	W	TH	U	V	W	TH	3D	U	V	W		TH
1	-483	405	-67	309.9	-270	364	-64	454	323.4	9	-394	574	-6	697
2	-599	484	-14	309.0	-268	454	-81	555	327.7	36	-417	612	16	768
3	-559	684	-2	320.7	-664	420	-3	787	302.2	13	-702	478	11	850
4	-651	604	147	312.9	-398	507	3	646	321.9	25	-571	644	-52	862
5	-481	619	207	329.5	-548	703	75	892	322.0	20	-511	770	-91	925

CUMULATIVE MEANS

MIN	PEAKS			I				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH			
1	-483	405	-67	631	309.9	-270	364	-64	454	323.4	50	9	-394	574	-6	697	325.5	78		
2	-560	458	-31	728	309.3	-282	424	-75	521	326.2	41	20	-409	599	8	745	325.5	80		
3	-560	514	-24	767	312.2	-378	423	-57	588	320.2	34	16	-483	569	9	771	320.2	79		
4	-590	544	32	807	312.4	-384	451	-37	607	320.8	31	18	-512	594	-11	801	319.6	75		
5	-575	584	57	828	314.8	-406	487	-21	648	321.0	29	17	-512	619	-22	819	320.5	74		

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				TH
	U	V	W	TH	U	V	W	TH	3D	U	V	W	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	90	87	52	15	169	95	40	10	231	173	27	12	21.7
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	43	30	46	52	45	22	49	11	4.4	51	80	46	93
5	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				I SINE WAVE FIT				TH
	U	V	W	TH	U	V	W	TH	3D	U	V	W	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	92	77	48	84	120	85	30	59	14.5	164	124	24	42
3	75	124	42	104	215	69	44	141	16.8	198	118	19	63
4	77	111	97	105	168	70	51	114	13.2	162	106	41	79
5	82	145	110	110	165	115	63	149	12.1	148	117	48	86

HEIGHT = 90. VAD HREC2 VAD 12/07/76 HUNTSVILLE ALA. HD270. START TIME 10: 0:25 END TIME 10: 5:25

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT										
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	SP							
1	-429	577	-21	735	324.2	-278	527	35	596	332.0	29	33	-280	734	14	786	339.0	73
2	-518	611	-52	602	319.6	-520	326	31	623	302.0	13	20	-559	416	-8	705	306.5	101
3	-541	625	12	828	319.1	-144	481	-9	503	343.3	52	18	-327	646	-13	725	333.1	125
4	-502	675	115	843	323.2	-459	505	8	685	317.8	25	21	-576	621	-8	860	317.1	65
5	-546	651	203	1011	327.3	-504	396	-51	642	308.1	46	30	-625	799	-78	1016	321.9	73

CUMULATIVE MEANS

		PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-429	577	-21	735	324.2	-278	527	35	596	332.0	29	33	-280	734	14	786	339.0	73
2	-448	606	-42	780	321.1	-440	393	32	614	312.0	18	25	-466	522	0	732	317.3	92
3	-501	611	-28	792	320.6	-366	415	21	586	319.8	27	23	-431	553	-3	730	321.3	100
4	-502	632	19	809	321.5	-397	445	17	619	319.1	26	22	-480	576	-5	773	319.9	89
5	-508	663	45	834	322.3	-412	438	7	622	317.6	29	24	-500	608	-15	808	320.2	86

C-20

ONE MINUTE STANDARD DEVIATIONS

PEAKS		I. FOURIER COEFFICIENTS						I SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	70	6	55	3.1	75	124	9	4	13.7	75	121	6	12	11.6
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	35	65	24	31	4.2	67	7	86	39	4.7	147	140	6	2	13.6
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CUMULATIVE STANDARD DEVIATIONS

CONJUGATIVE STANDARD DEVIATIONS															
PEAKS			FOURIER COEFFICIENTS				SINE WAVE FIT								
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V	W	SPEED	TH
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	51	51	18	55	3.5	147	147	6	16	19.9	169	203	14	48	20.5
3	50	42	31	51	3.0	192	124	22	57	22.5	155	177	13	39	18.5
4	42	55	79	50	3.4	159	110	43	70	17.6	156	155	11	73	15.7
5	41	47	100	49	3.8	151	102	47	64	16.6	153	164	29	113	14.4

START TIME 10: 0:25  
END TIME 10: 5:25

MUNTSVILLE ALA. H0270.

VAD 12/07/76

VAD HREC2

HEIGHT = 180.

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	N	SPEED	TH	I	U	V	W	SPEED	TH	SP
1	-470	586	-23	771	321.6	-352	469	-55	592	322.8	27	55
2	-350	614	-60	770	331.0	-243	485	-59	545	333.2	37	82
3	-539	723	68	903	323.2	-576	503	-13	766	311.1	18	80
4	-196	813	87	841	346.2	-400	538	10	671	323.4	16	61
5	-525	690	34	868	322.7	-439	485	-49	655	317.8	29	51

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	N	SPEED	TH	I	U	V	W	SPEED	TH	SP
1	-470	586	-23	771	321.6	-352	469	-55	592	322.8	27	55
2	-410	600	-42	771	326.3	-297	477	-57	568	328.0	32	69
3	-436	625	-20	797	325.7	-353	482	-48	608	324.6	29	71
4	-367	678	10	810	331.5	-366	488	-31	626	324.2	25	68
5	-337	690	13	817	330.4	-375	496	-33	630	323.4	26	66

C-29

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	N	SPEED	TH	I	U	V	W	SPEED	TH	SP
1	206	128	93	28	18.0	83	92	4	23	11.8	137	23
2	392	143	129	33	33.0	34	46	8	25	5.4	1	62
3	0	0	0	0	0.0	0	0	0	0	0.0	0	0
4	119	57	19	24	8.8	43	13	89	15	3.6	42	31
5	0	0	0	0	0.0	0	0	0	0	0.0	0	0

CUMULATIVE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT			
	U	V	N	SPEED	TH	I	U	V	W	SPEED	TH	SP
1	206	128	93	28	18.0	83	92	4	23	11.8	137	23
2	265	130	94	25	22.4	81	60	6	34	9.6	111	57
3	237	125	95	63	19.4	143	53	20	93	11.2	122	56
4	231	139	94	57	18.1	120	52	49	82	9.3	101	63
5	271	129	88	56	18.0	114	48	46	77	8.9	105	71

START TIME 10: 0:25  
END TIME 10: 5:25

MD270.

HUNTSVILLE ALA.

VAD 12/07/76

VAD WREC2

HEIGHT = 470.

ONE MINUTE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP
	U	V	W	TH	U	V	W	TH	20	30	U	V	W	TH			
1	-294	740	-16	338.5	-376	513	27	656	323.1	24	15	-371	608	-5	736	328.3	104
2	-146	681	-139	347.9	-383	405	10	559	316.5	30	6	-405	506	5	649	321.2	83
3	-511	703	-43	323.9	-437	517	27	678	319.7	26	13	-505	617	6	798	320.7	67
4	-372	652	98	330.2	-402	529	69	665	322.7	24	17	-383	693	-23	792	331.0	64
5	-413	759	69	331.2	-396	654	37	765	328.9	22	15	-494	717	-15	871	325.4	63

CUMULATIVE MEANS

MIN	PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT				SP	
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED		TH
1	-294	740	-16	604	338.5	-376	513	27	656	323.1	24	15	-371	608	-5	736	328.3	104
2	-245	721	-57	771	341.6	-378	477	21	624	320.9	26	12	-382	574	-1	707	326.0	97
3	-351	714	-51	611	334.5	-402	493	24	645	320.4	26	12	-431	591	1	743	323.6	85
4	-355	703	-26	601	333.8	-402	499	31	648	320.8	25	13	-423	608	-2	751	325.0	82
5	-369	717	-2	613	333.2	-400	538	33	678	322.8	24	13	-441	635	-5	781	325.1	77

ONE MINUTE STANDARD DEVIATIONS

MIN	PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
	U	V	W	SPEED	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	190	39	80	34	13.6	161	166	2	37	20.1	210	149	4	17	20.2
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	12	70	0	64	2.1	62	86	45	105	7	31	19	12	5	2.6
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	67	48	14	45	6.7	100	121	21	156	1.8	30	37	25	48	2

CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT				TH		
MIN	U	V	W	TH	U	V	W	SPEED	TH	U	V		W	SPEED
1	190	39	80	34	13.6	161	166	2	37	20.1	210	149	4	17
2	150	44	91	69	11.0	114	132	10	62	14.7	150	121	7	51
3	184	44	65	80	12.5	92	105	24	75	10.4	126	99	9	62
4	165	50	84	75	11.3	82	95	28	67	9.4	115	90	13	59
5	144	59	84	73	10.0	79	117	25	98	8.9	103	92	16	77

HEIGHT = 360. VAD HREC2 VAD 12/07/76 MONTSVILE ALA. MU270. START TIME 10: 0:25 END TIME 10: 5:25

ONE MINUTE MEANS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	SP	3D	U	V	W	TH
1	-241	783	-34	343.2	-133	600	52	621	347.5	21	20	-239	735	-4
2	-323	549	-22	329.4	-249	435	48	501	330.1	19	40	-357	596	6
3	-501	644	54	332.3	-395	432	15	591	317.2	23	23	-526	578	-14
4	-245	709	-57	340.8	-303	549	41	628	331.0	25	34	-454	663	9
5	-300	779	114	339.2	-444	630	48	772	324.6	18	13	-438	764	-28
														882
														330.2
														48

CUMULATIVE MEANS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	SP	3D	U	V	W	TH
1	-241	783	-34	343.2	-133	600	52	621	347.5	21	20	-239	735	-4
2	-288	705	-30	338.6	-172	545	51	591	341.7	20	27	-278	689	-1
3	-341	687	3	332.5	-261	503	37	585	331.9	25	25	-377	644	-6
4	-342	686	-6	333.9	-268	504	37	592	331.7	25	27	-390	647	-3
5	-331	709	23	335.2	-312	534	40	637	330.0	23	23	-402	677	-10
														799
														329.2
														67

C-31

ONE MINUTE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	SP	3D	U	V	W	TH
1	204	23	46	37	14.0	14	14	14	11.8	138	58	19	12	11.0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	236	28	33	121	14.3	101	55	31	11.1	28	92	15	49	6.0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	243	60	39	31	16.8	74	57	71	2.6	51	7	1	20	3.1

CUMULATIVE STANDARD DEVIATIONS

PEAKS					FOURIER COEFFICIENTS					SINE WAVE FIT				
MIN	U	V	W	TH	U	V	W	TH	SP	3D	U	V	W	TH
1	204	23	46	37	14.0	14	14	14	11.8	138	58	19	12	11.0
2	152	136	47	115	12.7	96	10	70	13.1	119	90	15	50	10.8
3	204	102	60	108	14.2	105	34	52	17.2	161	99	15	47	13.7
4	189	72	59	98	13.2	96	31	50	15.4	147	89	15	45	12.4
5	185	92	77	89	13.0	103	34	97	13.5	128	93	17	64	10.6

START TIME 10: 0:25  
END TIME 10: 5:25

HD270.

HUNTSVILLE ALA.

VAD 12/07/76

VAD HREC2

$$\text{HEIGHT} = 540.$$

ONE MINUTE MEANS

PEAKS				FOURIER COEFFICIENTS				I				SINE WAVE FIT						
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-123	603	13	824	347.4	-304	479	-81	579	328.0	31	14	-380	753	-12	850	333.5	54
2	-456	471	-133	656	315.9	-222	439	-83	492	333.1	38	8	-326	653	14	730	333.4	75
3	-604	568	24	840	312.5	-339	464	-54	588	322.3	30	27	-486	602	0	775	321.0	63
4	-603	643	387	879	316.1	-558	341	-14	680	304.7	30	22	-673	601	-50	903	311.7	55
5	-608	688	135	878	323.8	-533	341	16	684	299.7	25	28	-149	398	-4	832	311.4	43

CUMULATIVE MEANS

PLAYS				FOURIER COEFFICIENTS							SINE WAVE FIT							
MIN	U	V	W	SPEED	TH	U	V	W	SPEED	TH	2D	3D	U	V	W	SPEED	TH	SP
1	-173	403	13	624	347.4	-304	479	-81	579	328.0	31	14	-380	753	-12	850	333.5	54
2	-248	693	-35	768	336.9	-276	466	-82	550	329.7	34	12	-362	720	-3	810	333.5	61
3	-404	643	-9	797	327.2	-309	465	-71	565	326.7	32	18	-412	673	-1	796	338.5	62
4	-438	641	-1	811	325.3	-351	452	-62	584	323.1	32	19	-455	661	-9	814	335.7	61
5	-471	640	-2	818	325.3	-351	428	-52	609	329.7	30	21	-304	595	-1	818	342.1	69

ONE MINUTE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT					
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	
1	6.9	10.4	41	87	6.3	15.6	59	27	33	16.3	15.3	6	64
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	4.7	16.3	24	76	10.4	42	7	3	20	3.7	25	24	34
4	0	0	0	0	0	0	0	0	0	0	0	0	
5	17.3	15.9	27	27	15.3	48.8	43.3	72	46	80.8	83.4	58.6	131

## CUMULATIVE STANDARD DEVIATIONS

PEAKS				FOURIER COEFFICIENTS				SINE WAVE FIT					
MIN	U	V	W	TH	U	V	W	TH	U	V	W	TH	
1	10.9	10.4	41	87	15.6	5.9	27	33	16.3	15.3	6	40	64
2	17.0	40.5	90	115	18.7	4.4	19	56	11.9	11.3	58	33	82
3	22.3	140	73	98	19.5	3.4	20	46	9.5	10.6	77	24	64
4	21.7	161	48	94	18.0	4	29	62	12.4	14.2	75	29	72
5	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
6	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
7	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
8	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
9	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
10	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
11	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
12	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
13	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
14	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
15	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
16	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
17	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
18	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
19	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
20	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
21	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
22	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
23	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
24	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
25	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
26	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
27	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
28	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
29	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
30	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
31	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
32	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
33	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
34	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
35	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
36	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
37	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
38	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
39	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
40	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
41	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
42	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
43	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
44	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
45	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
46	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
47	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
48	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
49	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79
50	20.7	151	69	93	17.3	1.7	44	74	14.7	14.9	261	33	79

Printed by  
United States Air Force  
Hanscom AFB, Mass. 01731

ATE  
LME